HABITAT MANAGEMENT SECTION

Annual General Meeting
Yellowpoint Lodge - April 25-27, 1989

Ministry of
Environment
Victoria, B.C.

Wildlife Working Report No. WR-46
July 1990

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A joint publication by the
Wildlife and Recreational Fisheries Branches
of the British Columbia Ministry of Environment

Wildlife Working Report No. WR-46
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EXECUTIVE SUMMARY AND RECOMMENDATIONS

Despite the high public profile that Environment has received in fiscal year 1989/90, there has been no additional staff or funds for the Wildlife and Fisheries Habitat Programs. The concepts of sustainable Development are widely accepted but little has changed to put these principles into practice. Thirty-nine new staff positions for enforcement of environment regulations signal a "get tough" approach, but stresses remedial rather than a pro-active approach to habitat protection.

Forestry development continues to be the major issue in habitat protection. Wildlife staff participated in the Range Review program. Recommendations for reduction in annual allowable cuts for the Williams Lake Timber Supply Area have gone to the Chief Forester but no decision has been reached.

Regional Wildlife and Habitat plans are underway to help articulate the Wildlife Program's habitat needs.

A think tank was held to review the role of the Ministry of Environment in environmental management and protection and the role, both in region and Victoria, of the habitat management sections.

Recommendations:

- Pursue additional funding for habitat, inventory, planning and to increase regional staff.
- Continue to support integrated resource management initiatives providing
- Environment staff are in decision-making rather than merely advisory roles.
- Increase inventory and habitat protection on streamside management and riparian areas in general.
- Continue the review begun by the think tank session.

PREFACE

The Habitat Protection Sections within the British Columbia Wildlife Branch were formed approximately fifteen years ago. The level of knowledge and understanding of the impacts of human development on fish and wildlife resources has vastly improved during this period. There has been annual general meetings throughout the history of the group.

The purpose of this publication is to begin to capture the issues and summarize the decisions and strategy put forward at the annual general meeting. This publication is meant to share with absent staff and management, the benefits derived from group participation and to measure the progress towards generally agreed upon goals.

ACKNOWLEDGEMENTS

The organizing committee consisted of Dave Jones, Sandy MacDonald, Bruce Pendergast, Rick Morley, Peter Lewis and Mike Fenger. Thanks go to Lynne Bonner and Linda Foubister who ably captured the discussions on a personal computer. Special thanks again to Doug Morrison for the seafood feast which couldn't be beat.

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SUSTAINABLE DEVELOPMENT AND INTEGRATED RESOURCE MANAGEMENT.

Jon O'Riordan, Assistant Deputy Minister, Ministry of Environment

The new Assistant Deputy Minister (ADM) of operations is Sheila Wynn. She will be going to all regions to talk with managers. The Deputy Minister, Richard Dalon, has a good environment and economy background which will provide more support for environment protection than anyone else in the Ministry. He encourages a team philosophy and would like to hear ideas either through the managers or directly. The Management Committee is a good team to work with for environmental concerns.

1. The Concept of Sustainable Development

There are two interpretations of sustainable development: sustain growth or sustain environment. Sustainable development can be used to deal with ecological principles, to avoid long-term irreversible changes, to protect those systems not replicating, to use as a base to argue for management decisions, our Ministry will use it this way.

2. Concept of Sustainable Development in Ministry of Environment

Philosophically, there has been an attitude shift in the way people act and think of the environment. At the Deputy and Ministerial level, there is no formal definition binding us, other than the quality of our mandate. It is difficult to get a consensus definition but will probably end up with some minimal conditions such as:

- protection of representatives of all ecological systems
- maintenance of productivity of all terrestrial and aquatic ecosystems
- avoidance of long term irreversible changes to ecosystems (especially those that are not replicated and considered threatened and endangered)
- basic levels of air, water and land quality via objectives and standards

The concept that man is not dominant over nature is not generally known to the public.

3. Ministry is in a Unique Position

The importance of the Ministry of Environment within Cabinet has changed in the last 6 months. The issue of environment is on top of the agenda now. The issues we had trouble with before are now going through, including major issues. There is $200 million to deal with improvements in our technology. Protection of the environment is our basic concern.

There are now the three E's: Economy, Environment, Education. Environment is now beginning to take off. For example, making Environment a single Ministry again. There is talk of toughening

enforcement and protection. There are 39 new positions in Ministry for enforcement. The specific allotments to fish and wildlife protection are still being worked out. All positions are regional allocations.

There is concern about our enforcement capabilities, we are looking seriously at proposals to change approach. There is not sufficient clout in our own legislation to deal with everything. We are considering a policy initiative.

4. Ministry Should be Taking a Leadership Position in Land Use Planning

There will be an emphasis on planning. Fish and wildlife regional plans will be an extra load, but I put a lot of faith in this process. The planning process is important to the development of the Ministry's position on sustainable development. In the next 5 years, you will see me champion strategic level analysis which will depend on the development of Ministry planning objectives and strategies, development of strategic and operational plans and the development of integrated information systems.

Figure 1 shows the present way in which Integrating Land Use Decision-Making is carried out.

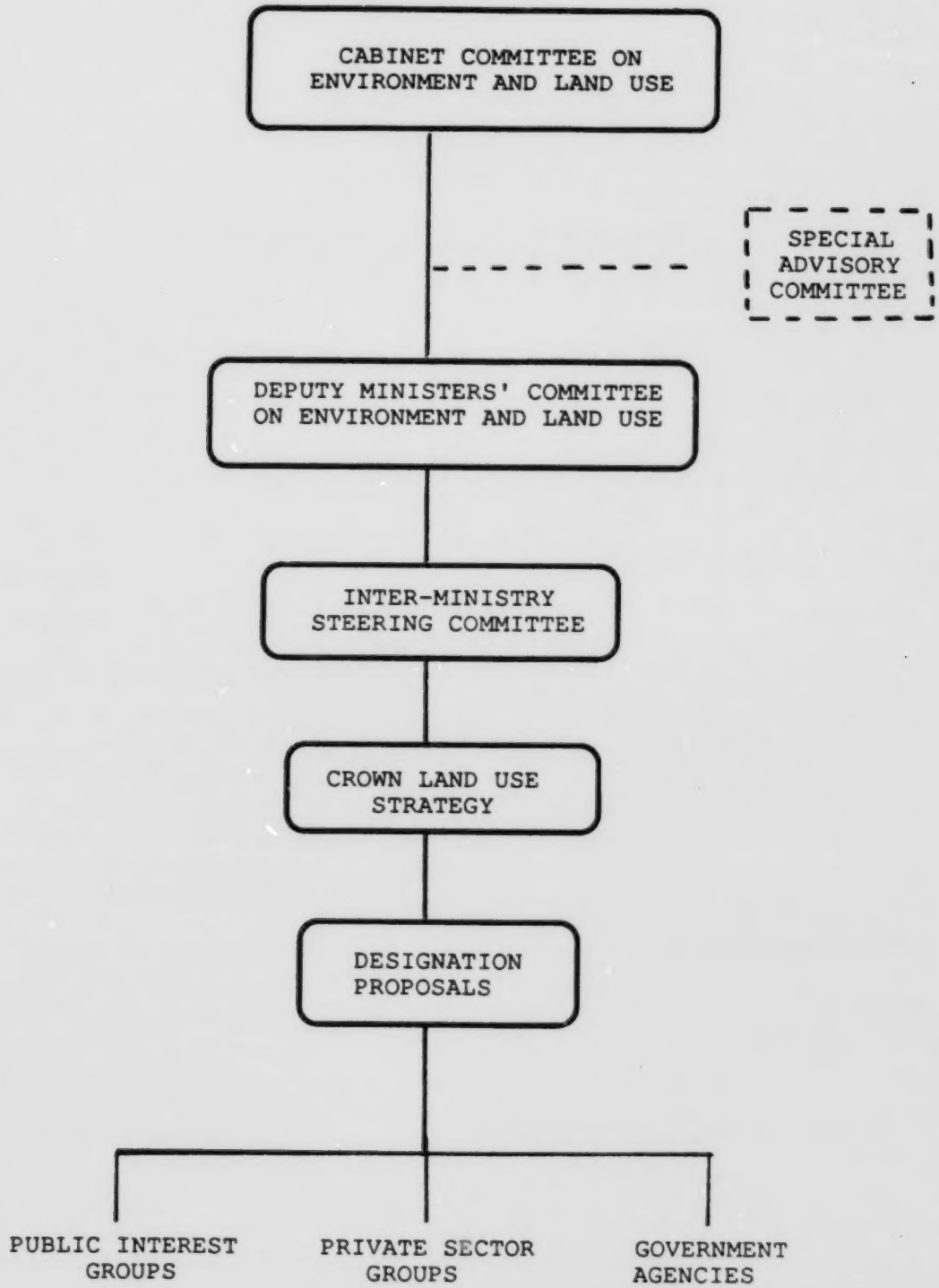
5. Progress to Date

This process for doing strategic analysis will include the development of wildlife and fish plans. Water and waste will also begin development of plans. In the next 2 years, there will be a revolution in thought by water management with new legislation, organization, development of a strategic plan for water use and a more integrated approach to water within an ecosystem framework. Waste management is also formulating a management plan that will emphasize policy development. There will continue to be a mines review. There will be a review process established for negotiating with regional development on wastes, landfills, toxic wastes, and energy. All major industrial developments will be reviewed and receive Cabinet approval before proceeding. These kinds of plans are coalescing through the ADM Committee.

The Crown Land strategy will need to be underpinned by these kind of analyses, too. Figure 2 shows the present designation process on Crown Lands.

Figure 3 shows the Forest Development Review Process. This process came about as a result of discussion with Ministry of Forests and will be used to deal with Tree Farm Licences (TFL) reviews, pulp harvesting, and possible range issues. The Forest Development Review Process is like the mine review process. It will be used to resolve issues for significant and sensitive areas concerning fish and wildlife, for example, to decide whether an area can sustain both the environment and a pulp mill. We are not prepared to write off streams or wildlife habitat.

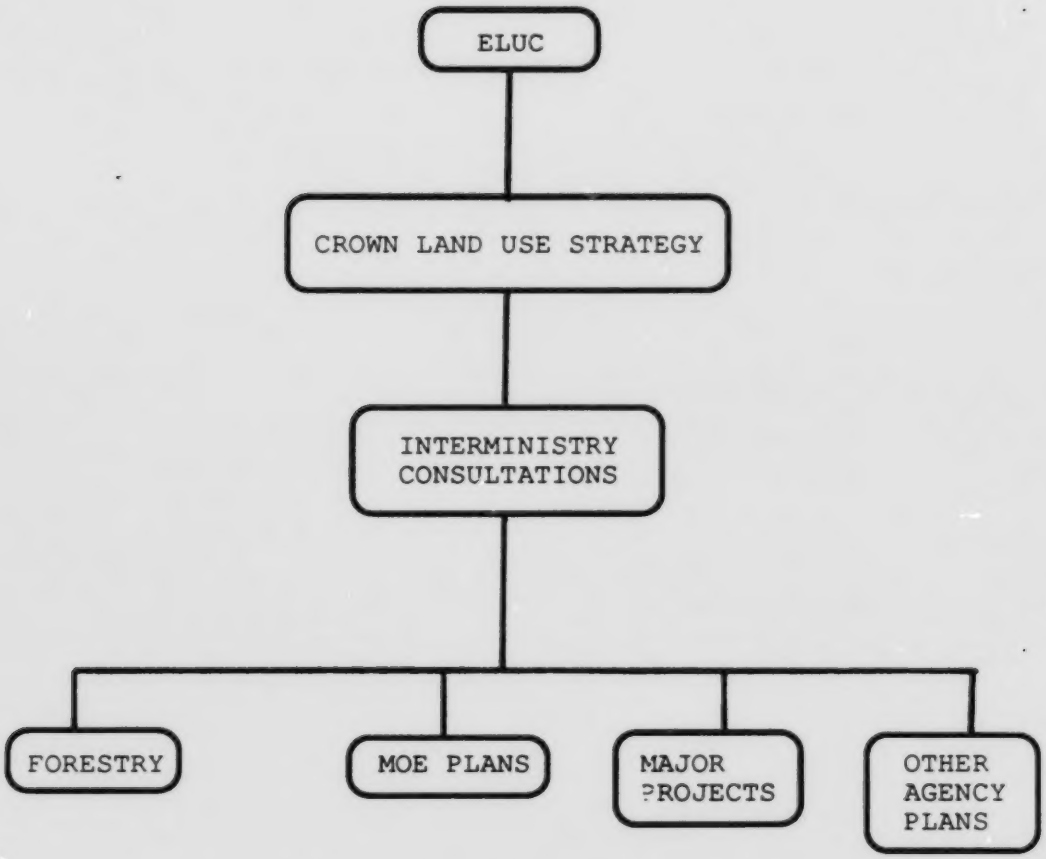
CROWN LAND USE DESIGNATION PROCESS



INTEGRATED LAND USE DECISION-MAKING

LEVEL 1

STRATEGIC ANALYSIS



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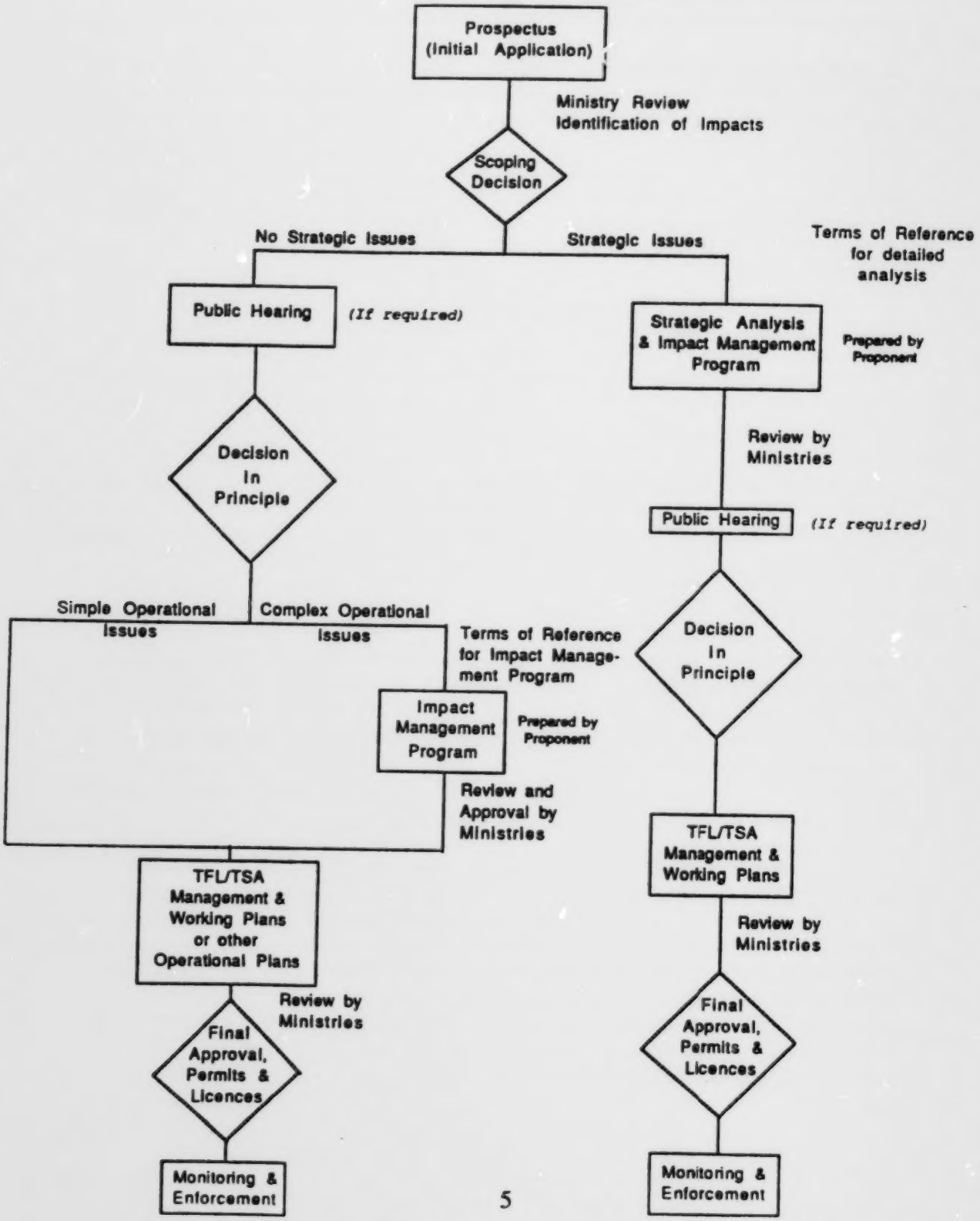
FOREST DEVELOPMENT REVIEW PROCESS



Before a public hearing is held, there will be negotiations through this process, using design and development of management working plans.

6. Operational Guidelines

The Coastal Fish/Forest guidelines are a good example of the type of guidelines that need to be developed. Fletcher Challenge questioned these guidelines last October and we had a meeting to "read the riot act" regarding the importance of the guidelines. They are very important, almost regulations, for habitat protection. Other guidelines envisaged are the Fish/ Forest Interior, Wildlife Coast/Interior, Watershed Operational Plans and Rate of Cut.

7. Monitoring and Enforcement

There has been a change in legislation. Thirty-nine full time equivalent (FTE) have been allocated toward enforcement. The placement of these FTE's will depend on a current workload assessment.

8. Information Systems

The multiple referrals system for Environment is underway. Data bases with links to GIS systems are being developed. There will be a harmonization of informations systems with Ministry of Forests and the private sector.

QUESTIONS

Q (Chislett): Has the Executive considered any training for technical, scientific staff? This is required for the 'people in blue', because our performance in court is not up to snuff, i.e., cases brought to court won't be successful unless we have better trained field enforcement staff.

Q (O' Riordan): Are you saying universal training for fish and wildlife technicians as well as waste technicians?
A: Yes.
Is that supported here? (General agreement).

Q (Pendergast): What do you have in mind for what will fly in terms of environmental legislation?
A: The public is saying MOE needs more involvement.

Q (Chamberlin): Do Conservation Officers (CO's) have a broader activity base or an environmental management mandate?
A: There has been some frustration in finding out what CO's do, it varies region to region. We are recognizing these regional differences but a stronger presence in terms of enforcement is envisaged.

Q (Jones): The watershed guidelines are not being complied with . Is there a push for forest harvesting regulations? (Jones)
A: Yes, that is a part of what we intend.

Q (Morley): Regarding staffing for habitat and the new increases in enforcement staff. We are $300,000 short of bark beetle money from last year. Any suggestions on how we should approach our strategy sessions and get funds for habitat protection?
A: Is the only option more money?

Rebuttal (Morley): The first option is more professional staff.
A: Generally, the Ministry did do well in a global sense in this budget. It's going to be difficult to go back and ask for more funds. Its not likely there will be a major infusion of resources for habitat protection. The public doesn't trust the Forest Service for protection of the Environment. MOE is the lesser of the two evils, we need to get together with MOF to work out where best to deal with protection and enforcement legislation. Waste Management got so much in this budget because of high visibility of waste problems, and they put together a plan of where their needs were.

Q (Morrison): On the issue of expert witness training - for fish and wildlife staff. We need much more training to be up to the literature and expertise required if we are to function as expert witnesses. We need specialists we can't do this on a universal basis
A: We have a prosecutor dealing with environmental issues in Prince George, but we do need to go this way more.

Comment (Travers): Guidelines are good, but the fish/forest guidelines are based on 20 years of research at Carnation Creek. We are not likely to have this type of background for many issues; we need to get ahead of the game. We need to get the point across, because guidelines may not be that successful. The companies involved with the Okanagan guidelines are questioning them and they are not getting good answers from us.

Comment (Narver): The highest priority in the next 3 months is to get Sheila and Richard out on active sites, so they can see and know what is going on out there, we'll never get there unless they have this understanding.

Comment (McDonald): I wonder about the cooperative spirit. We need to start getting habitat legislation to give legitimacy to our guidelines or plans. The public just doesn't believe us, we don't have time to do a professional environmental review. We need a legislative mandate.

Response (O'Riordan): Being involved at the policy level, we need this input and direction from staff.

Q (Cox): Regarding policy, the lower mainland doesn't have firm policy for fish and wildlife compensation and mitigation, i.e., a policy duplicating the Federal Fisheries, "not net loss", is needed. Is the executive looking seriously at this?
A: We did have a policy but it was never signed off.

Comment (Morley): We're proposing our Ministry adopt the Federal Fisheries habitat policy.

Q (Chislett): Regarding sustainable economy and environment, Tony Dorsey's work on Fraser R. basin defines sustainable development. Also, are we going to be able to use the concept to see at some time no large development?
A: A $3 million fund has been set up to encourage research in environmental management . The only string attached is that it needs to be matched from the Federal and private sectors. How can we use this fund creatively? Tony Dorsey's research is one of these. A number of major corporations are interested in providing monies and we're trying to find some way to utilize that money.There is a debate on whether sustainable development is a "how to?" or a "whether to?" development question. The environment part of the Task Force is on the side of "whether to".

Q (Martin): Regarding the 39 new positions, is there any chance that habitat will get some of these?
A: By May 3rd we will know, but it is enforcement oriented. CO's rather than technicians. *[Editor's note: none of the positions were assigned to habitat protection functions].*

Q (Holmman): Regarding new legislation . Will we get a shot at reviewing it from an operation level and have input if a new Water Act or Waste Act is developed?
A: Legislation is at two levels; first at the conceptual level, secondly the primary input for new legislation will be discussed with Regional directors. Make your views know to your Fish and Wildlife manager.

PANEL ON INTEGRATION: THE CONCEPT AND THE PRACTICE

Bruce Pendergast,
Acting Manager of Habitat Management Section,
Wildlife Branch

Integration is an old word with new meaning. The term was popular in the 1960's and was the opposite of segregation. What is the difference between earlier planning initiatives and now? Now there is a global perspective after Brundtland Report. Now integration is a part of mainstream economics. It has been shown that if we don't look after the environment then the economy is going to go downhill. This has brought more attention to the environment, but it is still "the Commons" (i.e., a common property) and it is difficult to get anyone to take the responsibility for it. However, this is part of the goal for integration.

In a recent paper John Dick goes over the processes and history of resource integration beginning with the establishment of Environment Land Use Secretariat (ELUC) in 1971. The paper points out that 85% of Crown Lands are under MOF mandate. There is a hopeful note on integration due to two new government initiatives in 1988: (1) new cabinet responsibilities, and (2) a strategic plan coordinated by the Premier's office.

Jim Mattison,
Water Management Branch

Land and water are the two main resources forming habitat. There is specific language in the Forest Act for cooperation. This may be considered the integrated approach.

There are multiple demands on water, most of which take water out of the streams. There are instream needs: mostly fish, but also needs recreation and esthetics use of water.

The present *Water Act* does not provide for an integrated approach. The Act is for allocation of water. A license application can be objected to, but there is nothing in the Act to say there must be a response. A policy has evolved that, if there is some water there, it is available for licensing. In practice, all applications are referred to Federal and provincial fisheries personnel and if they object, what do we do? It depends on how much water is there and how much does the applicant need?

We need some mechanisms to deal with allocation. We will continue to allocate water to licensees, but there is a need for instream uses. There were

22 appeals where water managers refused a license, but 21 were overturned. There is a reliance on regulation. Because streamflow changes, there are times when there is a shortage. Our licensing people are backlogged (in excess of 2,000 applications) and regulation has become a lower priority. Our attempts at legislation have not been successful.

How can we develop a mechanism?
Prior to the time required for a decision, you need to quantify your instream needs. A mechanism to allow fish needs to be included is required.

Jim Walker,
Director, Wildlife Branch

In relating integrated management to sustainable development we seem to be starting all over again. How does management fit into sustainable development? But practices remain the same. When can we expect to see the results? When are the cows coming out of the boreal forest?

Sustainable development is a catchword that everyone will define according to their own interests. Our Ministry can't afford to wait to let others define it. We should be taking the leadership role in defining what sustainable development means. Others will define it to get maximum production of wood and the overall liquidation of old growth.

There has to be a provincial strategy as to what is going to happen. An overall provincial land use plan. Where is fish a priority? wildlife? timber? I hope we've gone past thinking all resource uses on each piece of land is sustainable development. We need to press for these provincial strategies so we know where we stand.

In practice, once it boils down to a site specific issue it all falls apart. For example, a Wildlife Management Area (WMA) was requested at the mouth of the Dean River, where the best steelhead habitat in B.C. is. If we can't get this area, where can we get WMA's? These are platitudes, if we cannot get an area such as the Dean River designated as a WMA.

If integrated management is going to work, other organizations will have to accept our estimates and put more trust in our professionalism. We do not have the resources to do accurate inventories.

Before, we were trying to integrate fish and wildlife production with forest uses. Now we need to integrate wilderness, recreation ,wildlife viewing and other land uses. It is no longer as simple as it once was and it is going to become more complicated to deal with.

There are some absolutes. There is not enough staff to make integrated management work in our Ministry. Further integration will be difficult because there are so many more people and interests to deal with. Environmental groups have almost given up on us, because integrated management is not working. The moderates are becoming more radical because of our failure to show that integrated management can work from within government.

We used to lay a lot of charges against the forest industry, now we want to increase our enforcement. This is saying that integrated management isn't working. If enforcement is all we do, we lose the opportunity to work more closely with industry.

The present situation can't continue. It is a facade of doing good integrated management, when we haven't the resources to do it.

We know what to do, for example, the Dunsmuir Agreement calls for a zoning of the province, however, we are fiddling while Rome burns.

Dave Narver,
Director, Recreational Fisheries Branch

At Carnation Creek in the early '70's, the buzzword at that time was integrated resource management. It was a study designed with the integrated resource management concept in mind.

Integrated resource management is not doing everything on one hectare or one watershed. Integrated resource management is not alive and well in BC. The Babine Bridge is a worst-case scenario of integrated resource management. Also the Dean River.

There are poor communications and direction between policy branches in Victoria and regional operations. Some of this may be at the very top of MOF executive. Water management is another example of integrated resource management not working. Agriculture, imagine using integrated resource management in our dealings with agriculture.

The status of integrated resource management . One of the best examples may be placer mining. There is a lot of work to do to make integrated resource management work.

Jack Biickert,
Director, Integrated Resources Branch,
Ministry of Forests

MOF is committed to the concept of integrated resource management. A definition of integrated resource management is: a decision-making process where all resources are identified, assessed and compared before land use resource decisions are made. The decision may be either multiple or single use in a given area. The application results in a regional mosaic of uses and priorities. Integrated Resource Management (IRM) is a philosophy. The IRM manager has the role as the honest broker.

Single or multiple use are a result of scale - small areas are most likely a single or dominant use.

MOF has a mandate for IRM. In carrying out this mandate of integrated resource management it provides a framework for planning. Within plans there are Resource Emphasis Areas to deal with zoning for resource importance.

The IRM Branch has a staff of 184 of which 25 are in Victoria and the remainder decentralized throughout 42 district offices. They are coordinating between the general public, resource users, and others who have mandates to manage a resource on the crown land base. The IRM branch also includes the staff for the Recreation and Range Programs within the MOF.

The general approach taken with other resource users is to try and achieve integration with Memorandums of Understanding and Protocol Agreements.

This year our budget estimates have gone up 25% since last year and we need to continue to build resources back in order to do IRM.

Here are some extracts from a 1989 paper by a legislative intern - Frieda Young, entitled " Rights, responsibilities and liabilities of resource management." Frieda was a political science intern with MOF:

1. There is no other legislation or regulation for any other agency to use integrated resource management.

2. Rights - are clearly stated, but rights of one resource user compared to another resource user on a specific site is not well defined.

3. Responsibilities - general license or permits granted by Crown. The Crown does not accept third party liability and is not responsible for actions of the resource user vis-a-vis other resource users on same or adjacent site. There is an absence of clearly understood roles of agencies.

This paper is well worth reading.

Compensation for damages could be determined through civil litigation. This turns responsibility for decision making from government to the courts. The concept of integrated resource management is extremely vague.

The Forest Service is looking at techniques and tools for integration of resources such as: a method to prevent landslides on steep slopes, fish/forest guidelines, which are being implemented, and a handbook on mule deer winter ranges.

We need a better definition of other resource values and how to assess these values.

Much more integration is going to be stressed in pre-harvest management prescriptions and plans. New integrated resource management plans will be better than TFL plans. A TFL plan will not be approved if it doesn't involve other resource plans and address water production, recreation needs, tourism, public participation. The Okanagan Timber Supply Areas (TSA) will be a test for development of a plan.

Rick Morley
Manager, Habitat Management Section
Recreational Fisheries Branch

In Victoria, we hear a lot about the Brundtland Report. A quote from this report, "we are concerned about impact of economy on the environment. We are now concerned about the impact of environment on the economy." There are a lot of born again Bruntlanders who are worried about the environment because it influences the economy.

There is a problem in defining IRM. The management objectives from us such as production numbers are extremely difficult. We need more than good vibes from MOF on IRM, witness the Dean River.

Regarding the *Water Act*. There are problems with the Act and we welcome the proposed changes.

There is a problem with the definition of integrated resource management . We need to rationalize the conflicts in resource management.

I agree that we can't apply integrated resource management as all uses on one piece of land.

There are a number of absolutes. There is not enough staff to make IRM work. The work load is going to increase. I agree that more enforcement means the failure of environmental management and this will make it more difficult to achieve cooperation, alienating industries we have to work with.

Integrated resource management is not alive in BC and we do have serious problems. Environmental groups have given up on us.

In principle, the MOF is committed to integrated resource management. A definition of IRM must include a decision process where all resources are considered and assessed with a view to optimal use of the land, but what is optimal use?

The legislative intern program sounds interesting and MOE should look at taking advantage of it [comments from the audience that we have had a legislative intern].

The Crown's philosophy that it is not responsible for third party liability means that integrated resource management can't happen in this province as long as this policy continues. Hopefully this policy will change.

DISCUSSION

Narver: Fish management involves a lot of demand, it is a lot of access management. There have been suggestions that the Forest Service is dictating access.

Biickert: Our access management policy is in review.

Martin: We haven't seen it yet in Region.

Walker: I may deny this later, but regarding MOF staff, is there any merit in looking at an integrated resource management branch with MOF and MOE staff?

Biickert: We have 73 people in range, 61 in recreation, and others in planning, etc. This is our integrated resource management branch.

Chislett to Biickert: Regarding the apparent lack of communication between Victoria and the field. The Forest Service is essentially the planner for small industries and they are worse than large companies.

Biickert: The small business program has grown considerably, it makes MOF the biggest licensee in the province. We are starting to identify this problem, we are looking at working with digital resource systems for logging plan

software. We need to have a horizon of planning beyond 5 years, MOF will have to facilitate timber harvesting plans.

Chislett: When can we expect to see some improvement in that area, in the field?

Biickert: This has got to be a short term exercise.

Harper for Walker: A no net loss policy is needed. How do we package this policy to make it fly?

Walker: "If you can't mitigate it, then compensate" is the policy we developed. I'm cynical for our ability to get legislation with respect to wildlife, we can score with people like BC Hydro if we can have such a policy, but it will be very difficult to apply no net habitat loss to wildlife. It's not easy to sell, but we should try.

O'Riordan: A no net loss policy for wildlife is a light year away from fisheries policy. We have a strong Federal *Fisheries Act*, but nothing similar for the provincial fisheries. It is difficult to conceive getting wildlife into it.

Walker: The *Wildlife Act* was supposed to define wildlife habitat and yet we still have problems, so it will be even more difficult to get a no net loss policy incorporated into it.

Harris to Biickert: Could you provide an up date on the Wilderness Policy?

Biickert: Wilderness policy was included in the *Forest Act*, but the problem was what to do with it? We cranked out draft policy and guidelines, but industry didn't like it. The result is don't put wilderness on the map until there is an Order in Council (resource mapping...)

Soobotin to Walker or Biickert: How are we going to relate wildlife populations back to the land base?

Walker: We are required to have objectives for wildlife, but they will have to accept some quantum leaps in assumptions.

Biickert: We need clarification of objectives. Will there be a reduction in the land base or will we be able to meet needs of the caribou? To set the area aside while sustaining the local industry and jobs. We're willing to look at wildlife values but need to define the costs.

Fox to Biickert: How will IRM be accomplished operationally? Through letters of understanding etc.?

Biickert: We have to make certain, in forging appropriate policy and procedure, to make sure field staff understands the policy. We are looking very hard at present policy and procedure to get away from strictly TFL and TSA plans toward more integrated resource management plans.

King: Regarding small business problems, did any appeals have to contend with the no net loss habitat loss from Federal fisheries policy?

Addison: Yes, licenses were restricted so that low flows were addressed, but we're not doing this very well, need more from help from you people in defining fish needs.

FORESTRY, INTEGRATED MANAGEMENT AND SUSTAINABLE DEVELOPMENT

Range Review and Integrated Management

Ray Addison, Director, Range Program, MOF

Range Review Committee report included a review of grazing fees, however, the primary focus was on stewardship. The purpose of the review was to bring organization back on track and the concerns over staffing levels.

The steering committee (which included representatives from the B.C. cattlemen, B.C. Wildlife Federation, the forest industry, and government) set the terms of reference and defined working groups set up to address these issues. These groups recommended that the range program get more heavily involved in planning and there is a major new initiative in that area at the local level of planning.

Some time was spent trying to identify "range" and there was some difficulty due to different ideas of what range is . The habitat/forage line gets blurred in logging, grazing, etc. Trees and grasses are covered, but habitat for wildlife is not handled as directly.

There was an attempt to broaden the range mandate and establish a process for weighing livestock and wildlife needs. This needs to be legitimized as there are multiple interests in the range resource and wildlife.

The cattlemen would like MOF to be their advocate, but the Ministry cannot manage the resource and be an advocate. The forage resource comes first.

We need to bring some more science into range management. We are pushing the limits on resource capacity. The program is moving to get more into an inventory approach to determine carrying capacity and condition of the range resource and monitoring throughout the whole operational program. Auditing will also be required. This has been a missing aspect until now. We are trying to do this with no additional staff. This requires trade-offs, but overall goal is towards a more balanced program.

QUESTIONS

Demarchi: We can't expect MOF to do our habitat requirements. The ball is now in our court and we need to carry the message to our own executive that we must establish habitat requirements for our species.

Fenger: Allocating forage, estimating how much there is, this is a common goal with wildlife. Are you planning any joint inventory?

Addison: Not a lot of money will be thrown into inventory. We will not be doing more mapping, soils etc. but our intent is to tie it in with MOE wherever we can integrate inventories.

Biickert: Do you see some amendments in *Range Act, Forest Act* to implement this?

Addison: Absolutely, the *Range Act* written as parallel to *Forest Act* and this is giving us problems. The general mandate lies in just two lines in the *Forest Act*. We really need a clearer stronger mandate.

Wilkin: In Range Review was any kind of analysis done on cattle industry values in relation to value of wildlife?

Addison: It was dealt with in the concept of resource allocation, but we didn't come up with a magic formula. There are a number of analyses done on the industry. It is a subsidized industry; grazing fees are nominal, forage worth four or five times what we are charging for it. There is a lot of lobbying going on behind the scenes. If the livestock management business was separated from resource management it may be a lot easier.

Forestry Planning and Integrated Management

Integrated Resources Branch, MOF

Jack Biickert, Director

The concept of sustainable resource management, as defined by MOF (Frieda Young), is the deliberate planning for resources to interfere with each other as little as possible and complement as much as possible. Genetic diversity, maintaining life support systems, sustainable economy, doing more with less. Managing the flow of information so people can make choices about the environment and its use.

Efforts in forest management in BC requires MOF to integrate with the public. This rationale was in order to comply with the mandate in Section 4c of the *Forest Act*.

The public involvement policy is in draft form and is much revised from existing policy based on field experience. The policy will get out to review, by the end of June, to the public and other agencies. [Editors note: this has not occurred.]

The process of planning in MOF goes from provincial objectives and goals, policies, to TSA plans now called Resource Management Plans, to local resource plans at next level and to operational or site specific plans at bottom level.

MOF are redrafting the planning manual for the new integrated policy. Timber supply analysis (TSA) has been separated from planning.

There are a couple of other initiatives in planning such as the introduction of resource emphasis zones as a planning tool. These are broad land stratification for all component areas of a TSA, which should assist in streamlining the referral process.

Interest groups can give input to the Committee through the appropriate part of this process

The executive and managers are meeting to decide the composition of this steering committee. It should improve integrating planning and management, reduce focus on just timber management, removing timber analysis as primary focus. TSA planning process is the mechanism for better integrated planning.

QUESTIONS:

Q: Can you clarify the concept of resource emphasis areas?
A: It is an overlay of resource items on a TSA basis, geographic or drainage basis. It is used to stratify the map from low to high importance for each resource. It is a composite of where and what the emphasis for the various resources should be.

In the past, Forest Service has been unwilling to make any area designations but with these emphasis areas we can make designations on a local level.

Q (Travers): The modelling approach to planning, what is the relationship between that and the resource emphasis system?
A (Biickert): Will have to defer on that question.

"Pre-Harvest Silviculture Prescriptions: (PHSP)"

Paul Diggle, Silviculturalist, MOF

Picking up the pieces after a logging operation led to the need for pre-harvest prescriptions. They are necessary when:
- planning new forests to the free-growing stage
- planning other resource values
- preserving inherent site productivity

Now, after 2 years of implementation by regions - there is a need for revision. We had more difficulty with timber people in regions than anything else.

A planning phases working group was set up with a steering committee that includes fish and wildlife. This committee came up with a plan recommending modifications to timber harvesting process by looking at the timing of when things should happen.

Overhead: the Planning Flow TSL-TFL level management. Working Plan - 5 year develop Plan to PHSP Plan level. There is a need for more input from other resources at the higher levels (TSA, etc.).

Overhead: Issue of timing - short term things not helpful - can develop overall site specific plan to avoid potential conflicts by looking at the timing flow - PHSPs are cut-block related.

Overhead: Cutblock plan - if ecological similarity between cut blocks can apply between timber units.

Overhead: Field data forms to get site information- looking at potential concerns and responses to begin developing field prescription recommendations - preferred and alternative options.

The final prescription form will include word processing capability to expand on any of the areas in the form.

QUESTIONS

Q: Will these forms be standard?
A: We cannot force licensees to use them, but with feedback we will be able to do a more integrated approach.

Habitat Guidelines for Forestry

Mike Fenger, Habitat Forester, Wildlife Branch

From the strategy sessions at last year's meeting, guidelines seemed to be the way to go.

We had a couple of meetings on guidelines which have been summarized in a Wildlife Working Report, *Managing through guidelines: How far can you go*. Although this report raised more questions than it answered it has helped shape the kind of forestry/habitat guidelines we will get.

I would like to set up a technical committee on guidelines to get more input from habitat section heads. I hope to visit all regional offices to get ideas on a generic format and approach to habitat guidelines. The problem still exists on integrating fish,water, wildlife with forestry. Should they all be developed separately? I would like to take an ecological approach in describing habitats and identify what wildlife species to manage in those habitats. Habitat management objectives need to be described by Ministry of Environment before going to MOF and industry. We need to get more discussion/agreement internally before going to industry for discussions.

Habitat Guidelines for Forestry

Tom Chamberlin, Head of Stream Inventory, Recreational Fisheries Branch

Coastal guideline process is alive and functioning with important policy support from senior levels. In June we will be training instructors of regional colleges so the Coast Fish/Forestry guidelines will be part of the system now. An operational level training package for companies has not yet been funded and is in a bit of limbo, it needs a kick.

Regarding the Interior process. There have been several meetings on Interior fisheries guidelines and directions from the joint DFO/Recreational Fisheries habitat committee have established a small group to look into the stream and lake classification issue, can the coastal system be imported to the Interior. There is another group looking at what has been done with fisheries guidelines in other parts of the province.

How to integrate? All resource interests at once, or separate modules? Probably separate modules is the way to go. Interior guidelines will complement the coastal guidelines rather than conflicting with them.

Lakes are more important in the Interior than on the coast and upstream impacts are more sensitive issues. The cumulative effects and rates of cut should be addressed as part of Interior process.

Quantifying values is important in this process, we need numbers for engineers and economists. Potential productive capacity is presently being used. The management responsibility is ours but industrial collaboration is required initially and for training and format.

<u>QUESTIONS</u>

Q (Biickert): Did the committee look at Okanagan TSA guidelines?
A (Chamberlin): Yes.

Q: Do we have to start talking about how many moose, elk are enough when doing TSA planning and involvement? How can we develop guidelines without answering this first?

A (Fenger): We recognize this, in a perfect world we would get agreement on objectives before the guidelines. The regional plans are the beginning of setting program goals but I do not think it wise to wait until these plans are completed before stating some habitat requirements.

Q: Still being asked to quantify where we want our resource base...

Morley: The reason it didn't get anywhere was because industry was not involved. The reason why the coastal guidelines worked is because industry agreed and signed them off.

Walker: In the Williams Lake TSA exercise, the chief forester agreed with the way MOE staff did it. But there is still a need to know if you need that many mule deer in that area. You can go through the guidelines without saying the number needed, but consider the ecological needs.

Habitat Silviculture Protection Account (HSP).

Bruce Pendergast, Acting Manager, Habitat Management Section

This year, the bad news is that the total $650,000 is down to $300,000 for FRDA this is due to a Treasury Board reduction to a third the money allocated to the Emergency Bark Beetle Fund so our funding was reduced.

Task specification form submissions add up to a lot more than this $650,000 total. The Memorandum of Understanding (MOU) this year encourages development of guidelines. There is some pressure to go to province wide guideline development rather than regional. We put in a submission, then found how little money is available. We need to come to a consensus of where the cutoff line should be. We can cut Victoria submissions quite a bit. A coordinator to administer the HSP Account was also proposed.

<u>QUESTIONS</u>

Beets: What is the bottom line that we're getting?

A: $450,000 for fish and wildlife. Also, there is an explanation for bark beetle cuts. The work that has been done has not resulted in an increase in cut.

Beets: I don't see the need for guidelines for a coordinator, the money should go to regions.

Soobotin: Access is a problem, not just increased cut but changes in plans.

Morley: We asked where are MOF plans for spending bark beetle money this year. They agreed to send us those plans and we can make a case for more money. I don't think this will happen.

McDonald: We need some fast decisions to do some cutting this summer.

Jones: Has MOF transferred responsibilities to licensees?
A: Probably, in part.

Beets: Did the audit make a difference to the money we got?
A: No.

Chislett: Regarding the audit. We contacted the auditors and said we should be audited as well. They agreed but we haven't seen their report. The terms of reference for evaluation of FRDA has gone out for review. Why isn't there an evaluation of how those funds were spent and whether or not they achieved their objective?

Herbicide Silviculture Issue Paper

Rick Morley, Manager, Habitat Section, Recreational Fisheries Branch

The Fisheries Branch submitted 5 issue papers for increased funding:

1. Implementation of Fishing Guide Policy
2. New Forestry Policy
3. Placer Monitoring
4. Low Flow Issue
5. Silviculture .This is the subject of this talk and it was the lowest priority of the 5 issue papers.

Fishing Guide and Silviculture papers were approved.

We developed an implementation plan to spend $600,000 - but then we found out that we didn't get the $600,000 . The End.

Old-Growth and Integrated Management: A Contradiction in Terms

Ray Travers, Forestry Specialist, Recreational Fisheries Branch

There is no question that the textbook on forest management is not only being revised but completely new books are required. This new knowledge has grown out of major research by the United States Forest Service (USFS) managing for vertebrate populations.

Looking at the old-growth question, viable populations, endangered species, there has been $2 million used to address this research (in Olympia, WA).

As a result, insights of how forests evolved through time and structural characteristics of forests, including live green trees, snags, fallen trees on water and on the ground; we know from stream work the importance of LOD; this research has shown these are important in terrestrial systems as well, coarse woody debris, CWD.

Structure, composition and function of forests. A slide show covering the main points as follows:

- ecological characteristics of old-growth forests
- old-growth forests different from managed forests
- old-growth forests increase in complexity as they age; managed forests decrease in complexity
- clearcutting in groups, patches or strips
- old-growth forests are one stage in forest development
- wildlifers called old-growth forests "biological deserts" because of few numbers of species
- old-growth forests should be viewed as ecosystems
- the total profile of old-growth forests ecosystem - disturbance, young phase, shade tolerant species, increasing snags, fallen (coarse woody debris)
- normal rotation is really at the end of a young forest converting forests from old-growth forests to managed forests - shorter rotations through management (60-70 years)
- the tree fall gap is new, important concept - roles of snags and coarse woody debris, windfall-nurse logs, etc.
- fire as a disturbance compared to clearcut - large input of coarse woody debris from fire
- productivity of old-growth forests - characteristics - individualistic, large deep crown
- stand respiration related to stand age, net production peaks at early age and declines thereafter
- lot of production that is consumed in decomposition
- large wood structures are important as animal habitat, substrate for plants, sources of nutrients, etc.
- large snags as habitat - are short lived (100 years for a Douglas-fir over 24")
- down logs - site of nitrogen fixation, etc. (down logs in streams = LOD)
- functional features of old-growth forests - conservative of nutrients, produces food, source of logs and snags, habitat for many birds, mammals, mosses, lichens, insects and microorganisms
- old-growth forests are a net source of insect predators - high ratio of predatory insects to problem insects - advantage from pest management point of view
- old-growth forests - optimum habitat for many species, obligatory for some

- management regimes, which incorporate objectives of biological diversity, must be developed.
- mammal diversity is greatest at early stages of succession
- depends on what our objectives are as to which stage is optimum

Q (Chamberlin): The book is being re-written but are there any forests being managed to 300+ rotation in the U.S.?
A: There are in the National Forests, especially in spotted owl areas.

Chamberlin: That management option may be compatible to riparian management objectives.

Fox: Is it normal, loosing increment, volume?
A: That has been measured.

The Burning Issues in the Muskwa and Kechika

Miles Thorpe, MOF, Fort Nelson

Introduction

- My perspective of integrated resource management and particularly resource emphasis areas.
- The first thing one needs is to inventory all available resources.
- One resource and its use will have to become the priority, all others to be integrated into it.
- In Fort Nelson the District is divided into an industrial zone and recreation wildlife zone.
- For all intents and purposes, the entire District is unroaded except for the Alaska Highway and the Simpson Highway to Yellowknife.
- The area being looked at for wilderness is approximately 2.6 million hectares in size.
- The inventory will help determine how to manage the area - in the area logging and mining not necessarily disallowed.
- Constraints will be applied to the industrial activities so that any impacts will be compatible with recreation/wildlife. This is a cost of operation in a wilderness area. This could be done by allowing winter roads only for example.
- The mapping inventory process will help determine which resource is the priority in this area, wildlife would be a priority.
- As a result we have a large burning program of about 10,000 ha/year.

Now the slides:
- two things to see in the slides.
  - one: the size of the area and program
  - two: the site conditions present when burning

- 99% of burns for wildlife
- 15th May to 1st June burning season - some fall.
- no indices, climate only - less than 30% R.H.
- 2 to 3 days since rain 15 degrees +C - 15-25 km/h wind
- excellent cooperation with guides and HCF
- 40% of burns probably used by horses

QUESTIONS

Q: Has there been surface erosion, mass movements?
A: Surface erosion, yes, mass movements, no.

Q (Fenger): Monitoring should be part of the burning program, concerned about species shift from balsam to trembling aspen?
A: Yes.

STREAMSIDE MANAGEMENT

The State of the Art in the East Kootenays

Dennis Hamilton, Habitat Protection Biologist, Invermere

What do we know about riparian zones? Riparian zones are unique to both fish and wildlife. They only compose about 5-8% of the land base, and in the Golden TSA, they make up 42% of the high value habitat.

What are we doing? In the TSAs in which we are working, we identified, mapped, and integrated riparian zones into planning processes. The Forest Service now recognizes the importance of these areas.

What do we need to know? We need to better quantify the effects of impacts on riparian zones on fish and wildlife.

Streamside Management and Fish Habitat

Geoff Chislett, Recreational Fisheries

We haven't done a lot of thinking in Victoria in a structured way on riparian zone management. A riparian management group in Victoria has been considered. An official in the U.S. Department of Agriculture and Forests stated that protection of riparian habitat is one of our greatest problems. There is no secret on how riparian habitat should be managed, but this is very difficult to implement. The Western Division of the USFS recommended that all riparian areas be recognized as separate entities and managed effectively.

We should recognize riparian zones in legislation in order to manage them. The powers for protection and conservation of fisheries are federal. The province has authority to indirectly deal with protection of freshwater fisheries habitat. This gives us a window to develop the concept of working with other agencies to identify the importance of riparian zones to habitat.

Q (Brian Harris): Do you include upland with adjacent riparian?
A (Dennis): Yes, from alpine to valley bottom if you could see the influence of the watercourse on the land.

Doug Morrison: If you go with guidelines for riparian zone management, we have found with the fish/forestry guidelines that the logging lobby prevented use of the term "rate of cut".

Dennis: We're not willing to approve any cutting plans without riparian zone protection.

Timber/Fish/Wildlife, the Washington Experience

Ken Raedeke, Center for Streamside Studies, University of Washington

A politically appointed Forest Practice Board exists in Washington State. In the early to mid-1980's, the forest management debate became more contentious due to the economy. Indian rights complicated the issue. The federal court ruled that the Indians are entitled to half of all the state fish (Boldt decision). The state appealed. In 74 court trials, the score was Indians: 74, State: 0; the State had to pay the Indians' legal costs. Boldt also said that the tribes have this right in perpetuity.

In July 1986, the University of Washington organized a symposium on fish/forestry interactions. The relationship was more complex than imagined. There were positive aspects of the relationship, too.

The Timber/Fish/Wildlife (T/F/W) process got its beginning from the Boldt decisions and the symposium. Participants included representatives of 22 Indian tribes, industry (Weyerhaeuser, Scott Paper), government agencies (Departments of Natural Resources, Ecology, Fisheries and Game) and environmental groups. After 6 months and 8000 person-hours, an agreement was reached. A key point of agreement was that the State of Washington needs both a viable timber industry and protection of its environmental resources. Further, it was agreed that these needs are not mutually exclusive. A series of goals and objectives were established, prescriptions were developed, review periods were introduced, and adaptive management was followed.

Roads came up early as an issue. Fisheries wanted to minimize numbers of stream crossings; industry wanted to minimize costs. Riparian management zone sizes dependent upon the size of the riparian community were identified. Management of riparian zones had to be determined, such as how many and what type of trees can be cut. Buffer management zones for wildlife were recognized: 2 acres for every 160 acres harvested. A monitoring program was also recommended.

In early 1987, agreement was reached. Some problems resulted as the implementation team members were not familiar with the history of the process. The goal is to manage cooperatively, not idealistically protect the resource. A model to predict stream temperature and effects on fish was scheduled for 6 months after the agreement; this has not happened. The costs of research and monitoring were underestimated. The T/F/W process is run by consensus; it runs smoothly until someone objects. The main thing is that an agreement is in place, the agencies are still talking. T/F/W is like a new religion in Washington; time will tell.

The Center for Streamside Studies is not an active participant in the T/F/W process. They act as a service group. The Center has a 5-year program. It consists of 3 program elements: education, research, continuing education (workshop, symposia).

QUESTIONS:

Q (Ray Travers): What trade-offs were made by the various players?
A (Ken): The initial compromise was that timber harvesting was a legitimate activity. Fisheries compromised on the width of leave strips. Wildlife wanted 40 acres for every 160 acres harvested, but came down to 2 acres for every 160 acres.

Q (Dave Jones): What processes/programs do you have in place to explain these guidelines to the loggers?
A (Ken): The Department of Natural Resources puts out brochures to educate loggers and hold workshops. Ignorance of the law and good intentions do not matter; a stop-work order can still be made.

Q (Dave Stephenson): What about old-growth protection?
A (Ken): We will continue to think about it. This is not as big an issue in riparian zones as elsewhere. There is very little old-growth in riparian zones.

Q (Don Eastman): What about Federal involvement?

A (Ken): Much of the land is checkerboard - Forest Service, private. Alternative plans involving everybody in watershed can be developed. These are useful, but more difficult to negotiate.

Q (Brian Harris): Isn't 2 acres/160 acres ridiculously small for wildlife protection?
A (Ken): Zero acres were required before; it is the principle that matters; the recognition that special areas can be set aside.

Q (Garry Alexander): In the absence of production models, how do you make trade-offs?
A (Ken): Negotiation in marathon sessions. It was best guess. Everybody wanted to avoid fighting it out in court.

Q (Tom Chamberlin): What about the Federal agencies?
A (Ken): The Federal agencies have developed guidelines. They are more willing to set lands aside. They feel left out and their biologists feel hurt. The Federal government protects Indian treaties, so feel defensive.

The Role of Research in Streamside Management

Don Eastman, Manager, Research and Development Section, Wildlife Branch

Dennis Hamilton involved the Research and Development section in the riparian zone management issue. After discussions with Brian Nyberg of the Ministry of Forests, a HCF proposal to do a problem analysis was drafted. However, funds were not approved. So we have a proposal, an estimate, and terms of reference but no funding.

Q: Have other sources of funding been pursued?
A (Don): Timing was right for HCF and so we decided to try it. If there is strong support, we will try an interagency approach for government funding, or Wildlife Habitat Canada funding.

Q (Doug Martin): The Americans seem to be further ahead than we are. Is there any way we can get a group from B.C. down to attend symposia in the States?
A (Don): We can try. Or see if we can bring people up here.

Q (Doug Morrison): Is there any intent to include coastal areas in this?
A (Don): The main push came from the Interior. If there are real problems on the coast, we can address these as well.

Bruce Pendergast: The project was rejected by HCF as it was not tied to any geographical area.

Sandy MacDonald: Protection of wet meadow complexes in the subalpine should be addressed, in addition to streams.

Don: The definition of riparian zone has not been finalized. We have limited resources, so we must rank topics.

The Fish/Forestry Interaction Program and the South Moresby Forestry Replacement Account

C.P. Lewis, Head, Physical Processes Unit, Recreational Fisheries Branch

The Fish/Forestry Interaction Program (FFIP) was initiated on the Queen Charlotte Islands in 1981 by the B.C. Ministry of Forests, the B.C. Ministry of Environment and the Federal Department of Fisheries and Oceans. The objectives of the program included:

- understanding harvest impacts on fisheries habitat and forest sites;
- minimizing logging-induced slope instability through silvicultural treatments and the use of alternate logging methods; and

- mitigating the damage caused by landslides with the use of stream and forest site rehabilitation techniques.

Phase I of FFIP was completed in 1987. Its output included numerous MOF Land Management Reports and outside publications, a major workshop on the Queen Charlotte Islands and a set of policy recommendations for senior management in the Ministry of Forests. The recommendation was also made that FFIP be continued as a 5-year Phase II program starting in 1988/89 and focussing on information transfer, field demonstrations, monitoring and selected research. A budget of $200,000 per year was requested but the participating agencies agreed only to continue funding at the ongoing level of $150,000 per year. This raised the possibility of major program cuts and led to a search for additional outside funding.

Fortunately, a goose with a golden egg appeared in the "person" of the South Moresby Forestry Replacement Account (SMFRA). This fund was established to permit enhanced forest management activities in order to improve forest yields and maintain jobs in forestry as part of compensation to British Columbia for establishment of the South Moresby National Park. Potential undertakings that qualify for SMFRA funding include research and demonstration projects that have the potential for improving forest management and thus increasing AAC in areas currently deferred from logging due to slope instability. Enter FFIP II with a series of proposals for support that led to an additional $75-90,000 of funding per year during its lifespan.

FFIP then, remains an important focus for habitat-related Research and Development in the province with budgeted average annual expenditures of $230,000 per year. The remainder of this document highlights some of the major activities that either are or will be going on during the life of the program.

GENERAL DISCUSSION

HARVESTING

Operational Feasibility of Logging Unstable Terrain with Helicopters

R. Krag, FERIC

- objective is to assess the economic and operational feasibility of using helicopters for clearcut and selective-cut logging on very steep and/or gullied terrain.
- 12 sites have been identified.
- FFIP will undertake terrain surveys prior to and after harvesting and FERIC will monitor the harvesting operations.

- engineering considerations in field layout and operating techniques will be described in detail and factors which affect or aid operational efficiency will be identified.
- the project is FERIC and SMFRA funded and will last 4 years ending in 1992.

Helicopter Logging of Unstable Terrain

S.C. Chatwin and R. Laird, Ministry of Forests

- objectives are to determine the effects of helicopter clearcut and partial cut logging on mass wasting on unstable hillslopes and to compare with clearcut logging using conventional cable systems.
- 5 naturally unstable hillslopes will be used with the 3 different harvesting treatments plus an unharvested control on each.
- the project is SMFRA funded and will last 6 years ending in 1995.

SILVICULTURE

Alternative Silvicultural Systems for Streamside Management Zones and Steep Slopes in Coastal B.C.: A Problem Analysis - J.T. Standish, Stewart and Ewing Assoc. Ltd.

- summary of the advantages and disadvantages of various silvicultural systems that could be applicable to environmentally sensitive areas.
- concluded that partial cut systems in streamside sensitive areas offered great potential but saw difficulty in extrapolating streamside results to steep slope situations.
- recommended, however, that steep slope demonstrations be attempted on the Queen Charlotte Islands.
- the project was FFIP funded and was completed in fiscal 1988/89.

Alternative Silvicultural Systems for Environmentally Sensitive Areas on Steep Slopes - F.T. Pendl, Ministry of Forests

- objective is to demonstrate silvicultural techniques that will stabilize helicopter clearcut and partial cut unstable hillslopes and provide a perpetual yield.
- 5 sites will be established and treatments will include site preparation by controlling slash and soil screening, rapid planting with large stock spruce and/or hemlock, variations in stocking density and cleaning and sanitation cutting.
- the end product will be silvicultural guidelines for clearcut and partially cut, steep unstable slopes.
- the project is SMFRA funded and will last 6 years from May 1989 to March 1996.

REHABILITATION

Watershed Rehabilitation Planning System - W.W. Carr, Terrasol.

- this was an operational trial of a watershed rehabilitation planning methodology developed to assist the forest industry in ranking funding allocations for maintenance, roads-to-bed and erosion control programs
- a sediment and erosion control plan was developed for a small watershed and the approach, methods and procedures for evaluating benefit/cost were documented in detail.
- the project was FFIP funded and was completed in fiscal 1988/89.

Sewell Inlet Stream Rehabilitation Project - H. Klassen, contractor.

- single log placements with a subset complexed by rootwads cabled to the downstream side were installed in lower Clint Creek in the summer of 1988.
- the structures were evaluated after extreme fall flooding modified the sites and displaced two of the logs.
- FFIP funded and completed in 1989.

Stream Rehabilitation Project Monitoring

- in addition to the Sewell Inlet structures, there are 23 other rehabilitation structures in QCI streams, some in place since 1982, together with 4 artificially constructed side channel pools and 6 mainstem pools.
- the objective of this project is longer term monitoring to assist in the development of guidelines for construction and to establish benefit/cost relationships based on actual increases in smolt production attributed to the stream restoration measures undertaken.
- this project is FFIP funded and will begin in 1989/90 with completion scheduled for 1991/92.

SLOPE STABILITY

Field Guide for Management of Landslide Prone Terrain - D. Howes, D. Swanston, S. Chatwin, J. Schwab.

- preparations of this field guide were begun during FFIP I.
- it consists of 4 chapters: (1) slope movement processes and characteristics; (2) techniques for stability hazard assessment; (3) measures for control and management of unstable terrain; and (4) forest road deactivation and hillslope revegetation.
- this project has been FFIP funded and will be completed in 1989.

- it will be followed up with a video that introduces and highlights the main topics of the guide and within the B.C. Ministry of Environment, by a course given by Don Howes for interested staff.

Landslide Susceptibility Mapping Using Digital Elevation Models - O. Niemann, UVic and D. Howes, MOE.

- the objective of this project is to investigate the potential for generating slope failure probabilities by using only geometric properties of the landscape determined from a digital elevation model based on Terrain Resource Information Management (TRIM) specifications.
- because TRIM data will eventually be available province-wide, the resulting methodology will be transferable to other areas with minimal effort.
- the project is FFIP funded and will be completed in 1989.

A Critical Test of Methods to Predict Hillslope Stability on the Queen Charlotte Islands - S. Young, Dep. of Geography, UBC.

- a number of different techniques for predicting hillslope stability following roadbuilding and logging have been used on the Queen Charlotte Islands.
- these include: (1) ESA mapping from air photography; (2) subjective stability classification from terrain maps; (3) failure probability ratings from terrain maps and clearcut failure frequencies; (4) parametric estimation of failure incidence from air photo and map measurements; and (5) parametric estimation of failure probability form topographic information.
- these methods will be tested by comparing predictions made either before logging or using only pre-logging information with post-logging events.
- the project is an SMFRA-funded M.Sc. Thesis and will run for 2 years beginning in 1989/90.

GULLY MANAGEMENT

Gully Stability Classification for Forest Land Management - D. Maynard, contractor.

- the objective of this project is to provide a systematic approach to mapping and describing gullies in order to identify limitations for forest management.
- a stability classification scheme will be developed for use by experienced terrain scientists.
- the project is FFIP funded and will be completed in 1989.

Synoptic Case Studies of Current Gully Management Techniques - R. Laird, MOF.

- the objective of this study is to investigate the effectiveness of existing management practices undertaken to reduce sediment input to streams from gullies.
- 30-40 case study areas from throughout the Pacific Northwest will be selected on the basis of quality of documentation, ease of access, representativeness of the treatment and availability of personnel with experience at the site.
- the project is SMFRA funded and will run for two years, ending in 1990/91.

The Effect of Logging Debris in Gullies and Logging Debris Clean-Out on Torrent Initiation and Magnitude and Gully Sedimentation - Graduate Student, Dep. of Geography, UBC.

- the objectives of this study are:
  (1) to assess the role of logging debris and logging debris clean-out in stabilizing or de-stabilizing a gully;
  (2) to assess the effectiveness of gully clean-out in controlling torrent size; and
  (3) to assess the role of gully debris in controlling chronic sedimentation from gullies.
- 3 to 6 gullies will be selected for detailed study by repeated surveys and process measurements - including patterns of water movement - before and after logging.
- in addition synoptic surveys of sediment sources and sediment yield will be conducted in a large sample (ca. 20) of gullies.
- the project is an SMFRA-funded Ph.D. Thesis and will run for 5 years beginning in 1990.

Gully Yarding Experiments - R. Krag, FERIC

- the objective of this study is to identify operationally feasible and cost-effective harvesting strategies for the removal of logging debris from gullies.
- the same sites will be used as in the UBC Ph.D. study, above.
- harvesting related field work will involve assessment of total logging, monitoring of logging operations and post-harvesting disturbance surveys.
- the project is FERIC- and SMFRA-funded and will run for 3 years beginning 1989.

Debris Flow Control Structures in Gullies - R. Askin, MacMillan Bloedel Ltd.

- the objective of this project is to develop suitable earth-berm control structures that will contain or control debris flows exiting from recently logged gullies.
- structures will be installed at the base of selected unstable gullies with the cooperation of local forest companies.
- their structural integrity and performance over time will be monitored
- the project is SMFRA-funded and will run for 5 years beginning in 1989.

CHANNEL GEOMORPHOLOGY

Sediment Movement and Fate in Channels - Dan Hogan, contractor.

- this study is a carryover from FFIP I and involves completion of the reanalysis of sediment data and comparison of the sediment transfer characteristics of stream systems in undisturbed and disturbed watersheds.
- analyses of <2 mm sediment and the D_{50} indicate very little difference among streams systems but investigations are continuing using only the finer end of the sediment size distribution (<0.85 mm).
- this project is FFIP funded and will be completed in 1989.

Channel Response to Mass Wasting Inputs - Dan Hogan, contractor.

- the objectives of this study are:
  (1) to determine diagnostic criteria of the nature and extent of channel response to mass wasting sediment delivery;
  (2) to identify and describe the factors controlling rates of response to sediment loading in channels; and
  (3) to incorporate the results into a classification system and methodology for predicting the probable response of a channel to a given mass wasting input, including downstream propagation and recovery.
- preliminary findings indicate that a fundamental consequence of debris torrent inputs is the establishment of sediment wedges associated with debris jams.
- specific sedimentological, morphological and hydraulic changes occur upstream and downstream of the jams and jam integrity and longevity control the temporal response of the channel.
- this 4-year project is FFIP funded and will be completed in 1991/92.

Bed Material in Queen Charlotte Islands Streams and the Impact of Disturbance: A Model to Permit Routine Assessment of Condition - S. Rice, Dep. of Geography, UBC.

- the objectives of this study are to compare the distribution of bed material textures in logged, unlogged and severely mass-wasted basins and to develop a simple predictive model.
- an extensive sampling program will aim to identify variations in material size both within and between individual channel links.
- the project is a component of the channel response study and will run for 2 years beginning in 1989/90.

FISHERIES

Duration of Mass Wasting Impacts on Resident and Anadromous Fish and Fish Habitat - Graduate Student, Dep. of Biology, UBC.

- the objective of this study is to examine the relationships between juvenile fish population characteristics and the amount of fish-rearing habitat, riparian zone development and degree of dewatering in streams having a wide range of mass wasting ages.
- this FFIP-funded project will be a joint investigation with the geomorphology channel response study.
- it will begin in 1989/90 and continue for 2 years.

Coho Overwinter Survival - Proposed graduate student project.

- the purpose of this project is to collect further data quantifying the effects of mass wasting on juvenile coho salmon populations in logged and unlogged streams
- specific information of interest includes: age and growth characteristics, summer and winter habitat utilization, rearing habitat and fish and winter habitat utilization, rearing habitat and fish cover characteristics, fall densities, numbers of smolts produced and post-smolt migration summer densities.
- this project will be a FFIP-funded M.Sc. Thesis and is scheduled to last 1 year.

MISCELLANEOUS

Criteria for Comparison of Drainage Basins and for Regional Extension of FFIP Results in Slope Stability and Channel Response - A. Cheong, Dep. of Geography, UBC.

- the objective is to develop an operationally efficient procedure for selecting comparable terrain units so that experience of land management

or terrain history and condition in one unit can be projected into another with some confidence for management purposes.
- the study will include: (1) selection of appropriate parameters to characterize land units and streams; (2) establishment of the appropriate degree of similarity for an acceptable comparison; and (3) a demonstration analysis for a substantial area within the Queen Charlotte Islands.
- the project is a FFIP-funded M.Sc. Thesis and will run for 2 years beginning in 1989/90.

What needs to be done to improve riparian management in British Columbia? - *General Discussion*

We must work on:
Incentive to get people together
- Environmentally sensitive Wildlife areas (Ew) class 1 within TSA planning process is a mechanism to do this.

Legislation
- The Environment Management Act, the Water Act, the Fisheries Act and the Wildlife Act can be considered as possible vehicles.

Identification of riparian zones
- Guidelines
- Definition

Management
- A Committee (Chislett, Alexander, von Schuckmann) should be established to recommend policy.

INFORMATION SYSTEM DEVELOPMENTS

Information Systems and Office Automation in Wildlife and Fisheries

Chris Grant, Computing Services and Art Tautz, Research Section, Recreational Fisheries

Chris Grant:
A Management Committee Decision Request was initiated to obtain decisions on budget. The solutions proposed took the form of eight corporate initiatives:

1) Implement newly purchased computers as stand-alone computers
   - Training plans are to be developed before computers delivered,
   - Delivery scheduled by the end of May.

2) Help regions develop Regional Strategic and Operational Technology Plans

A contract has gone out to develop a corporate Regional Technology plan, an action plan, and a migration strategy outlining acquisition plans and budget. [Regional Technology plan completed, used for Nanaimo Office Automation pilot, other plans not funded].

3) Implement Regional Micro-Computer Networks [not funded].

4) Corporate Office Automation Integration
   - Replacement of AES with Ministry work stations, a comprehensive plan dealing with word processing, filing, etc, must be developed. A project team to set up a pilot region with a micro-VAX has been established. [Nanaimo office automation pilot].

5) Technical Consulting for Regional Offices
   - A position to do this has been proposed, with the duties including assistance in development of the region's budget, advice, and integration. [Development of decentralized end user support].

6) Update Ministry Strategic Systems Plan, as required by Treasury Board. [deferred until 90/91].

7) Develop a Regional Business Model
   - A number of commonalities exist among the regions, e.g., the licensing function. [deferred as part of 6 in 90/91].

8) Determine requirements for Corporate Referral System

- The Habitat referral system should be a corporate system. Funding must be ensured to do this. [Deferred pending development of Ministry Policies and Procedures on referrals].

RESULT: $285,000 was [Funding was capped at $54,000 in June 1989] received to work on these projects. Many are planning projects.

Art Tautz:
There are three levels of data systems under development:

1) Corporate information: Ministry data bases, e.g., Administrative data bases.
2) Program level: Fisheries and Wildlife Program level. For Fisheries, this is the responsibility of the Fisheries Data Committee. e.g., fishing licence sales.
3) Personal data bases: on personal computers. Problems include disk crashes, lack of back-up.

- The Fisheries Program is involved in the following:
- Hatchery data base - stocking data, origin of stocks, etc.
- Lake inventory data base
- Stream information system - Federal system, salmon data
- Client data bases - fishing licences, steelhead harvest analysis, angling guide licence system. An angling guide operating plan has been proposed.
- Creel census data base - under development
- Geographic information systems - to be discussed later

We have taken initial steps in designing fisheries data bases. This is just the beginning. Funds are needed for further developments. We should be thinking in June about issue papers.

Don Eastman: I have problems with the jargon used, such as, regional business plan, technology strategy. Please think carefully about labels used. Where is the wildlife information system update in this section? The Wildlife Program did not agree to provide an update.

Marty Beets: I question whether Computer Services should have received $285,000. They haven't proved that they are worth it.

Chris: Trust us. If you're not satisfied, we will be gone.

Geographic Information Systems

Introduction - Rick Morley, Manager, Habitat Section, Recreational Fisheries

Four of us attended a conference in March - GIS 89. The Geographic Information System (GIS) is important as it is becoming very popular and it is expensive. This is the third year of the conference; in the first year 80

people attended, in the second, 300, and this year, over 1000 people were in attendance. This illustrates the interest in GIS. The Ministry of Forests is developing a GIS.

A GIS is a set of procedures for analyzing and managing geo-referenced data. A GIS tells you "why what is where".

What can it do for us? Overlays of geographical areas can be useful. The cost/benefit analysis shows that there is no clear cut dollar figure benefit people can put on these systems. The costs are scary: 10-20% are related to hardware/software, 80-90% are related to data base development, input, and verification. We already put a lot of effort into our data bases.

Crown Lands is the lead agency for the development of data systems. They are implementing a pilot program on this.

SUMMARY: You should remember that large costs are related to data bases. Don't worry about hardware. Remember you can never have enough storage via hardware. Recognize there is a long learning curve for staff. We have to have strong senior executive support as GIS is expensive. The GIS environment is coming, whether or not we like it. We don't have the money, our counterparts in industry do. We are trying to gain the support. It is critical.

A GIS Primer - Pete Lewis, Head, Physical Processes Unit, Recreational Fisheries Branch

Geographic Information

- a ***geographic feature*** is one that, in addition to any other characteristics it might have, can be located spatially on the surface of the earth.

- all geographic features can be reduced to ***3 basic types:***
  - points;
  - lines; and
  - areas (polygons).

- ***areas*** are the most common data type in natural resource applications.

- the ***description*** of a geographic feature involves 3 kinds of data:
  - location and extent (where);
  - a unique label to distinguish it from other features of the same type; and
  - a set of attributes that describe and classify the feature (what).

- a ***map*** is the traditional way of storing and displaying geographic information; not only does it show us where and what, but it also helps us to understand why, i.e., the relationship of the feature to other features, connected, adjacent, close to, far from.

What is a "Geographic Information System"?

- a "Geographic Information System" is simply, ***a set of procedures*** for managing and analyzing geographic data.

- its ***primary function*** is the identification of relationships among features, within a common theme or across themes: why what is where.

- there is nothing new about GIS in itself: geographers and others have been managing and analyzing geographic information for centuries.

- ***what is new is the technology***: when we speak of GIS today, we are talking about integrated sets of computer hardware and software tools used for the acquisition, management and analysis of geographic data.

- the new automated GIS is taking off because it permits rapid and flexible integration of data from different sources and because it is far easier to use maps and graphs to make a point than a long written discussion.

GIS Data Models

- the use of geographic information systems involves the integration of graphic (location of spatial) and non-graphic (attribute) data.

1. Spatial Data

    - two basic types of ***spatial data models*** have evolved for storing digital data:
        - vector; and
        - tesselated (e.g. raster). (See Figure 4).
    - ***vector data*** is characterized by the use of sequences of point coordinates to define a line.
    - ***tesselated data*** uses a grid-cell data structure where the geographic area is divided into cells identified by row and column; cells either do or do not contain the line.
    - the vector structure is good for data input and graphic output and the tesselated structure is good for analysis.
    - several existing GIS's integrate both approaches.

2. Attribute Data

- the most common is the ***relational model*** which organizes the data in tables. (See Figure 5).
- each table within a table represents an attribute type and stores values for the attribute.
- data can be stored in several tables and tables can be joined or referenced to each other by common items.

<u>Components of a GIS</u>

- geographical information systems have ***4 main components:***
  - an input subsystem;
  - a storage and retrieval subsystem;
  - a manipulation and analysis subsystem; and
  - a reporting/output subsystem.

1. Data Input Subsystem

- this subsystem allows the user to collect and transform both geographic and attribute data.
- hardcopy maps are the most popular source of ***geographic data*** and the overwhelming majority of the data from those maps is entered by manual digitizing.
- ***attribute data*** can be any text or tabular data that is referenced to a geographic feature.
- most of it is input manually by keyboard.
- data volumes will tend to be very large in any GIS project and one can expect that over 70% of the time required to do the entire project will be involved in data input and verification.

2. Data Storage and Retrieval

- this subsystem organizes both the geographic and the attribute data in a form which permits the user to retrieve it for ***querying*** and ***analysis*** and which allows rapid and accurate ***updates*** to be made to the database.
- in most GIS's, the spatial data is organized by qualitative content into ***themes or data layers***.
- layers are commonly defined based on the needs of the user and the availability of data and serve to separate major classes and to logically order the data.

3. Data Manipulation and Analysis

   - this subsystem allows the user to define spatial and attribute ***procedures to generate derived information*** in order to answer particular questions, often by overlaying previously defined data layers.
   - the transformation and integration of spatial data is ***the heart of a GIS*** and distinguishes it from other information systems and from computer-aided drafting (CAD) systems.
   - ***types of analysis*** include, in addition to overlaying, data reclassification (e.g., generalization), corridor analysis and proximity analysis.

4. Data Output

   - this final subsystem allows the user to present derived information products both graphically, normally as maps, and as tabular and statistical reports.
   - graphic display is the primary output, initially on a computer screen but, if needed, on a hardcopy device like a plotter.

Remember!

- the only unique thing about a geographic feature is that it can be located spatially on the earth's surface.
- geographic information systems have been around for a long time; only the computer-based technology and the analytical speed and flexibility that results is new.
- the defining criterion of a GIS is its ability to transform and integrate spatial data.
- data volumes in any GIS project will be very large, often far beyond initial estimates.
- data entry and verification will take over 70% of the total time needed to complete a GIS project.*

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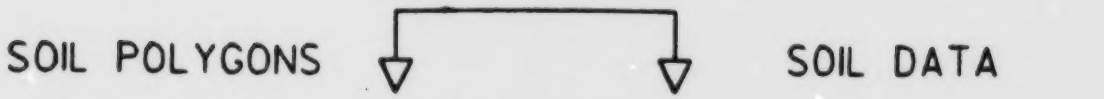
* David J. Buckley. 1989. "A Geographical Information System Primer, Version 2". A text used in a one-day "Introduction to GIS" workshop at the GIS '89 Symposium held in Vancouver, B.C. on 7 March 1989. Alberta Forestry, Lands and Wildlife. Edmonton, Alberta. 85pp.

Relational Data Model



POLY #	AREA	SOIL CODE
1	37.5	AN 32
2	15.6	CE 12
3	41.7	BG 17
4	22.1	AN 32

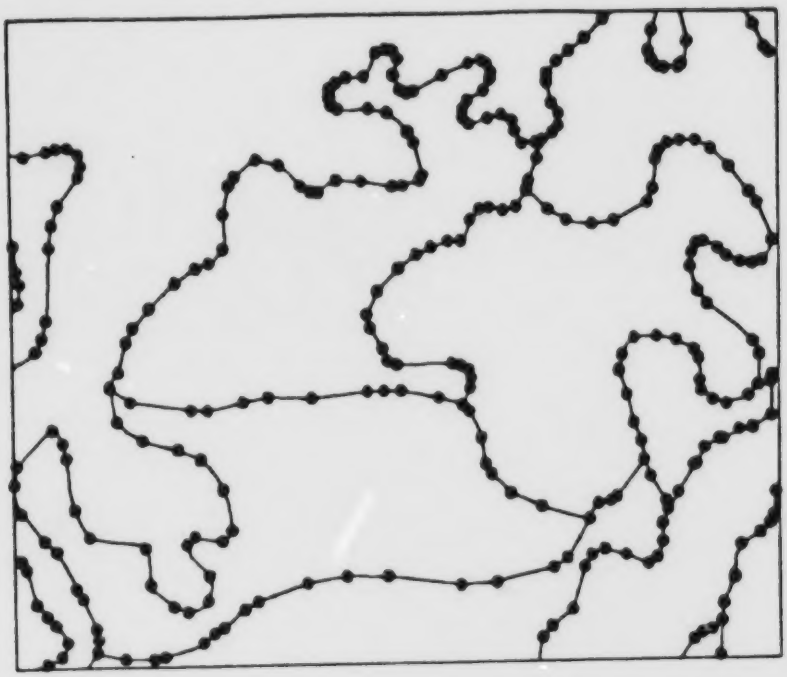
SOIL CODE	PH	SAMPLE DATA
BG 16	-1.7	11/23/84
CE 12	+3.2	04/06/82
AN 32	+1.7	12/22/81

SOIL POLYGONS + SOIL DATA

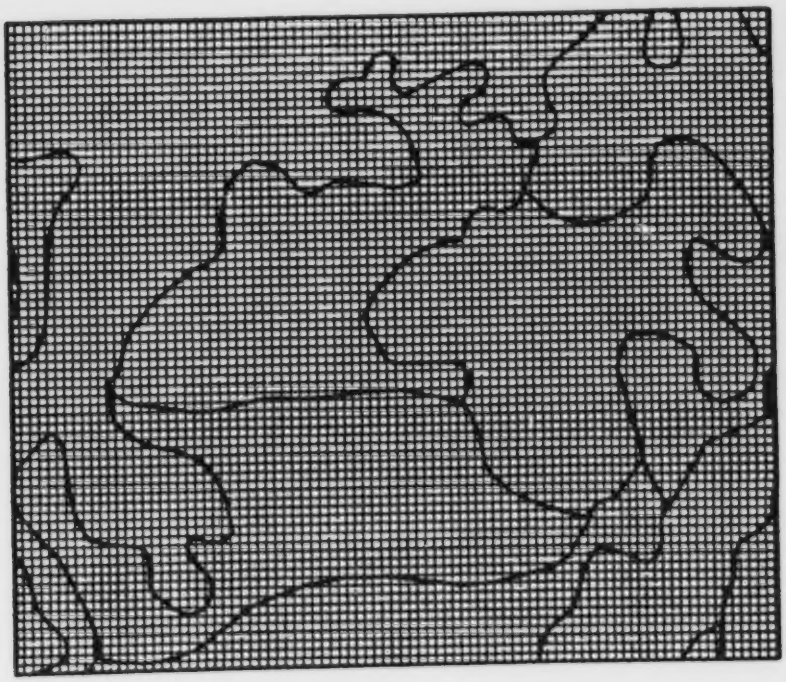
Poly #	Area	Soil Code	PH	Sample Data
1	37.5	AN 32	+1.7	12/22/81
2	15.6	CE 12	+3.2	04/06/82
3	41.7	BG 17	-1.7	11/23/84
4	22.1	AN 32	+1.7	12/22/81

Figure 5. Example of a relational database table using soil data. (Source: Aronson 1987)

Figure 4. Spatial Data Models.



Vector data organization



Tessellated/grid data organization

Source: After Peuquet, 1

Fisheries Applications - Tom Chamberlin, Head, Habitat Assessment and Stu Hawthorn, Habitat Assessment, Recreational Fisheries Branch

Tom Chamberlin:
The technology has overtaken our ability to use it. The hard slogging lies ahead.

Fisheries Systems Developed:
"G" - Stream Atlas: About half the province has been mapped; it is planned to have all the map sheets completed by year end.
"I" - SISS: On DFO's VAX
"S" - Prototype: run by Surveys & Resource Mapping Branch
- $750,000 project: A Quality Input Review Board allows Fisheries, Wildlife, etc. input. This is supposed to be done this year.
- Intergraph on VAX is dead; it will be extinct in the next year. It has terrain, soils, vegetation, etc. data on it.
- Stream Atlas Project Management Information System (SAPMI)

Fisheries Systems Under Development:
Stream Survey, Lakes, Hatcheries, Users - Guides, aerial, steelhead.

Down the Road:
Linkage problems (e.g., MRS-SISS)
Satellite images
Inter-agency linkages (e.g., with Ministry of Forests)

Issues:
- Data/System Management: There are no responsibility centres for data management. It is considered peripheral to everyone's job.
- Distributed Systems
- Support (bricks)

Burning Issues:
- Responsibility and support for data management
- Responsibility and support for applications and use
- Cost - Who will pay for it?

Stu Hawthorn:
1) Stream Atlas Project Management Index (SAPMI)
Water Management started work on digitizing and assigning watershed codes to streams on 1:50 000 topographic maps. They stopped at a very basic (skeleton) level. Fisheries Branch realized insufficient detail at this level thus enhanced (densified) level data capture underway. With some 1200+ maps to do, SAPMI created to track progress of data capture at 6 levels for each map. Environmental Sciences Ltd. (E.S.L.) designed a system using dBase III+.

- 45% of the Province has been done, but just the blue lines.

2) The second application was in area of fisheries production plans. Five questions were asked: *Could data be downloaded from VAX to PC; was data adequate for management; could Region use it; could varying scales be put together; could computer illiterates use this?* Cowichan was used as pilot. It was easy to download from VAX to PC; it did handle DFO's requirements for fish production plans; it will run on a 286 with co-processor; varying map scales could be integrated.

QUESTIONS:

What about linkages between agencies?

The same base maps are used. It is the base itself which integrates data.

Wildlife Branch Applications of Geographic Information Systems (GIS) - Marvin Eng, Research & Development Section, Wildlife Branch

Habitat Inventory (Victoria, D. Demarchi, 387-9772)
In the past, Habitat Inventory Section projects utilizing GIS have involved the use of the Ministry of Environment mainframe (CAPAMP). These projects have involved the digitizing of habitat, terrain and capability maps and the subsequent interpretation of those maps, through modelling processes, to identify features such as protected areas. Study areas have been:

1. Wells Gray Provincial Park;
2. Mt. Robson Provincial Park;
3. Manning Provincial Park;
4. the Purcell Nature Conservancy; and
5. the Lower Halfway area, west of Fort St. John.

Currently, the Habitat Inventory Section is investigating the use of a microcomputer based GIS (Pamap) for the Shorts Creek and Kalamalka Lake study areas. These projects are being used as prototypes to test the utility of the Pamap software and the 1:20 000 scale TRIM data produced by the Surveys and Resource Mapping Branch. It is apparent that the TRIM data can significantly reduce the work load involved in identifying the slope aspect and elevation of map polygons. The TRIM data may also enhance modelling procedures for the production of habitat and capability maps.

Wildlife Data Technical Working Committee (WDTWC, A. Harcombe, 387-9798)

In late 1986, the WDTWC approved the development of Master Project Plan for a habitat data base. The intent is to provide a common GIS-based

framework for the collection and storage of biophysical habitat information. Five prototype projects have been identified to investigate the feasibility of developing the habitat data base. Two of these projects will begin in May 1989:

1. A 1:250 000 biophysical habitat map for the Taseko Lakes (920) sheet will be digitized and linked to models for determining species habitat suitability and capability and density. The objective is to test the utility of 1:250 000 scale maps for overview planning.

2. A similar project at the scale for 1:50 000 for the Riske Creek (920/15) will test the utility of this scale for operational planning.

Three other projects will begin in the near future. These projects will assess the feasibility of generating biophysical habitat maps at 1:250 000 and 1:20 000 using a variety of data sources including digital data bases and information currently available only in analog form.

Research and Development Section (Victoria, T. Hamilton, 387-9761)

The Research and Development Section is using a GIS to assist in resolving the resource conflict between grizzly bears and forestry in the Khutzeymateen Valley. The GIS will be used to map existing bear habitat and bear use and predict the impact of various forestry scenarios on habitat supply immediately after logging and on future habitat supply.

Kootenay Regional Office (Nelson, G. Woods, 354-6341)

The Kootenay Regional Office is involved in four GIS projects:

1. Mapping of habitat capability and suitability for deer, elk and bighorn sheep in the Arrow Lakes area;
2. Suitability mapping and habitat management scheduling for ungulates in the Pend d'Oreille area;
3. Mapping of seasonal habitat for caribou and moose in the Revelstoke area; and
4. Mapping of harvest data, at 1:600 000 for southeastern B.C.

Integrated Wildlife Intensive Forestry Research (IWIFR, M. Eng, 387-9797)
(Cooperative project - Ministry of Environment/Ministry of Forests)

Since 1980, the IWIFR program has been studying the habitat relationships of deer and elk on Vancouver Island. Recently IWIFR has begun a project to develop a Habitat Analysis and Planning (HAP) tool that will translate the IWIFR research knowledge into effect tools for wildlife and forestry managers. A series of computer-based models will be developed that will

allow planners to incorporate consideration of the spatial and temporal aspects of ungulate habitat into the process of developing harvest schedules, habitat plans and operational forestry plans.

Gerry Fox: What are the other means of data input other than keyboard?

Pete: Scan coding sheets (automatic scan is not reliable), transfer from other computers, buy input data, digital remote sensing data.

Glen Carlson: An action item would be to tie in with MOF.

Rick: Talk to Stu. The Quality Review Board is involved.

Pete: An intraministry committee is working on defining a common standard among ministries.

REGIONAL TECHNICAL SESSION

Mamu of the Misty Isles

Lorne MacIntosh, Habitat Biologist, Queen Charlotte Island

Marbled murrelet - nest in old-growth forests, nests of large moss patches on older trees.

- elimination of murrelet habitat with the elimination of old-growth forests
- implications - instead of rotation age - we should be thinking habitat replacement age
- remnant old-growth by Cumshewa Head
- murrelets - nearshore feeders, shallow water divers, fly with food inland to old-growth forest - these easier to fly into than younger forests
- best habitat for murrelet is along the east shallow side of QCI
- look for fresh fish on forest floor as indicators of murrelet presence
- little known about marbled murrelets, but some research being done, starting to get more information
- forest around Barkley Sound, Clayoquot Sound, for murrelets on Vancouver Island

QUESTIONS

Q: How much old growth required for murrelet habitat?
A: Unknown

Q: Logging plans?
A: In QCI this habitat has not been considered

Q: Any estimates of the number of murrelets in BC?
A: Not really, abundant in certain areas

Comment (Wilkin): Need to identify status in order to include murrelets in management plans.

Mackenzie Trappers Assoc. Fur Bearer Habitat Mapping Project

Bill Arthur, Habitat Technician, MOE, Prince George

- this program started to overcome the lack of trust the public has in MOE
- in cooperation with Mac Trappers Assoc - a low end inventory program to collect info from trappers
- provided 1:50 000 topographic maps covering Williston Basin to Trappers Association
- in 1 year's season, each trapper will put information on seasonal travel/migration routes on these maps

- this also provided new information on location of deer and elk ranges that wasn't known before

Started in 1988, in cooperation with the Mackenzie Trapper's Association, a member of the B.C. Trapper's Association.

The intent of the program is to collect detailed wildlife information from individual trapline holders with the Trapper's Association. The program is administered by the Trapper's Association with support from the Ministry.

Information collected being:
- Ungulate Wintering Areas
- Seasonal Travel Routes for Caribou, Grizzly Bear and Wolf Packs (pack size and range)
- Aquatic Furbearer Areas (Beaver, Otter and Mink)
- Upland Furbearer Areas (Marten, Fisher, Wolverine, Fox and Lynx)
- Any other personal/local comments

The information is being mapped on 1:50 000 NTS maps. One complete map set was provided to the Mackenzie Trapper's Association (area covering the Williston Lake area). All maps were supplied by the Ministry.

Individual trappers were provided 2 copies of the 1:50 000 NTS map sheets covering their trapline. The Association selected those trappers to be sent maps. Only those trappers who had long term and detailed knowledge of their trapline were selected.

The trapper would use the one set of maps for a working copy, following a standard inventory legend. After a complete trapping season, a copy (second map set) of the working maps are to be sent to the Trappers Association.

We propose assistance to the Trapper's Association in transferring the individual trapper submission onto the master set of 1:50 000 NTS maps held by the Association and to take a copy of the master set.

This information will provide important inventory to help manage furbearer habitats from the impact of Forest Harvesting and Silvicultural developments. The information will also provide Wildlife Managers with additional information on ungulate winter ranges and movements.

Letters of Credit and Covenants

Bruce Cox, Section Head, Habitat Protection, MOE, Lower Mainland

Restrictive Covenants - agreement between 2 parties to restrict activities on a given piece of property - these areas identified on maps - certain set of conditions in the covenant - registered and go with the land in perpetuity

- we use restrictive covenants in our referrals with municipalities and MOH
- a set of criteria used for streams
- are generally requested when fish and wildlife values warrant some kind of long term protection
- restrictive covenants - improve community awareness of fish and wildlife values
- responsibility of property owner - neighborhood peer pressure to comply
- if charges are brought, a restrictive covenant makes our position much stronger
- enforcement and monitoring - don't have the time to do much of this
- enforcement through a civil suit and government isn't keen to take citizens to court
- have had difficulties tracking where the restrictive covenants are located
- liability problem - restrictive covenants are in MOE's name and if the restrictions cause some damage (tree falling on house), MOE is responsible

Letters of Credit

- letters of credit - is a sum of money with an expiry date drawn on the developers account

Letters of credit came about as a result of problems with developers not adhering to our conditions on a site. MOE came up with requirement for developers to post a letter of credit to ensure work is done to our satisfaction.

Five Year Development Plans

Ron Diederichs, Habitat Protection Technician, MOE, Vancouver Island

Process on the Island has gone through changes since MOF backed out of much of process and assumed an advisory/auditor role. The companies are producing their own 5 year plans.

A 5 year plan consists of a 1:20 000 map with information on the following forest cover, logging/silviculture history, deer winter range, stream classification. This mapped information is done by licensee before it gets to MOE

Five year plan reviews are scheduled throughout the year.

TFLs: MOF entered into a letter of understanding (LOU) between themselves and licensee. This has changed the whole process, now licensee approaches

us directly rather than through MOF. We send back draft comments, licensee amends and produces final plan addressing all our concerns.

Cutting permits are approved by MOF without our input, but must comply with the 5 year plan, so 5 year plan is our main input.

These changes have meant more work, since MOF is not filtering out inappropriate activities. Licensee has freedom to do whatever they think appropriate in their cutting permit area. MOE has to make sure the 5 year plan resolves these issues up front and industry must have better hold on their own activities for this new system to work.

Pro-Active Planning for Mountain Pine Beetle Harvest

Brian Harris, Habitat Technician, MOE, Okanagan

Extensive areas of older lodgepole pine are now susceptible to mountain pine beetle attack. Present MOF policy is harvest or lose them and this requires vast areas of clearcutting. Large clearcuts can reduce wildlife habitat diversity and present a problem to ungulate movements due to loss of cover.

We were being swamped with logging applications. In order to rank the referrals and to maintain wildlife habitat in the face of this logging pressure, we contracted the mapping of wildlife corridors to be reserved from logging. These corridors are designed to take advantage as much as possible of rocky ridges, creek draws, swampy ground and less desirable timber as well as non pine timber types. Proposed logging in these corridors are subjected to close field inspection and discussion. We needed an inexpensive planning process, so we hired a contractor to do some mapping. If the mapped areas are to be logged, less susceptible types, are identified as wildlife corridors. These highlighted areas we needed to pay extra attention to.

<u>QUESTIONS</u>

Q: Is there a size cut-off for logging pine?
A: That is calculated as part of the Annual Allowable Cut.

Update on Access Planning

Doug Martin, Habitat Protection Biologist, MOE, East Kootenays

Access planning is going quite well in the Kootenays. The forest industry, on its own initiative, is doing trail cuts over 1 m in height, reclamation research programs.

Most access plans are in paper stage, implementation is not yet occurring (pine beetle program taking precedence).

Three major problems:

1. Changes in responsibility between MOF and industry. The private sector is not willing to participate in access planning if it costs them, unless compensation is available through appraisal system.
2. Lack of MOF access legislation and enforcement. There is a need for a better public information handbook. MOF had draft of policy on access.
3. Need to get Ministry of Mines involved in access planning. MOM is locally receptive but not in Victoria.

Public Involvement in the Salmon Arm Foreshore

Doug Jury, Wildlife Biologist, MOE, Thompson-Nicola

The property is in Salmon Arm Bay on both sides of marina development. The non government organizations (NGOs) ended up buying 25 acres (half of it), the remaining area is being developed into resort.

There are high shorebird values, moderate nesting in the sedge/cattail habitat. This is the most important shorebird staging area in southern BC. MOE hoped to get Ducks Unlimited (DU) involved to improve viewing opportunities. Because of the size of the development a technical committee was formed with MOE and Federal Fisheries to address developer's proposal. Developer provided some money for creating nature conservancy on the land he was selling. A society was formed called the Salmon Arm Bay Nature Enhancement Society.

QUESTIONS

Q: How long did the process take?
A: A year to a year-and-a-half.

Q: Is there much recreation in that area?
A: No, not yet, but boating etc. is planned.

The lesson here is that the developer was prepared to listen to the public and create an opportunity for conservation. If we can cooperate with a developer and there is no other choice, then we can take advantage of an opportunity and conserve some habitat.

Progress in the Preservation of Snags for Wildlife

Dave Stevenson, Habitat Technician, MOE, Prince George

As most of you know, snag tree management is finally being taken seriously by wildlife managers across B.C.

During the last 15 years, some of us have worked with varying success at retaining snags for wildlife. In the Northern region, we have had very little success. This is partly because the species that we were concerned with were mostly woodpeckers and raptors. Woodpeckers were perceived by foresters as having lots of habitat in beetle-killed trees. Raptors were so few and far between that the occasional eagle tree or hawk's nest could be saved if it were discovered early enough to save a clump of trees around it.

Our need for snag tree management has been intensified in the Northern region in the last few years due to high elevation balsam fir logging in caribou habitat.

Prince George Wood Preservers Ltd. has a 10-year "opportunity wood" year timber sale in balsam fir stands, much of which is in high elevation caribou habitat. P.G. Wood Preservers and Susan Stevenson did rough lichen estimates on a block that we have requested selective logging in George Creek (Figure 6). Their results indicated that a significant proportion of the lichen in that stand occurs in the snags. This confirms what Susan found in the Kootenays in 1978.

In Figure 7 we looked at several diameter limit prescriptions and, at the 35 cm minimum diameter limit to be removed, if we retained all the snags, 80% of the original available lichen would remain. If the snags were to be removed only 41% of the original available lichen would remain. These estimates are based on the assumption that no lichen would be lost during logging, which is of course misleading, since a significant amount is lost from trees brushing each other while falling.

Ideally, where logging must take place in high value caribou winter range, we would like to have the stands selectively logged with snag retention. P.G. Wood Preservers are quite amenable to this idea and have suggested that they could do virtually all the logging from inside closed vehicles: fellers-bunchers, grapple skidders and small cat site preparation and only burning on landings.

On 23 February Dave King and I met with Workers Compensation staff Ross Davidson and Ron Hunter, the Regional Manager, to discuss our ideas for the

Figure 6.

Proportions of Lichen on Snags and Live Trees

SB - KOOTENAYS

BS - GEORGE

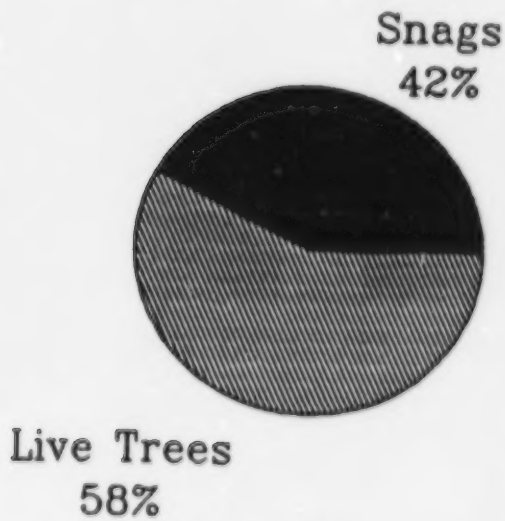
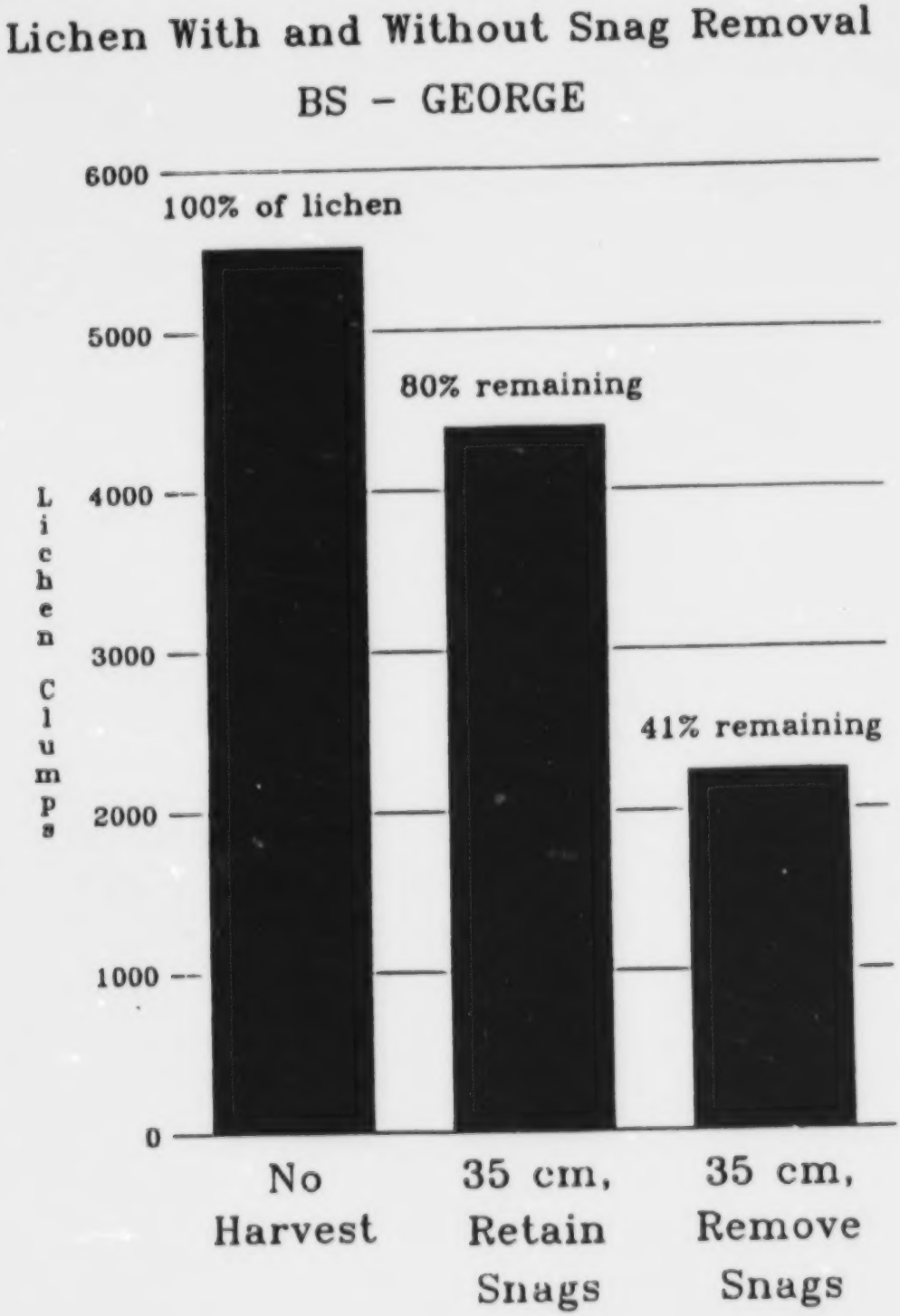


Figure 7.


Lichen With and Without Snag Removal
BS - GEORGE
6000
5000
4000
3000
2000
1000
0
Lichen Clumps
100% of lichen
80% remaining
41% remaining
No Harvest
35 cm, Retain Snags
35 cm, Remove Snags

Prince George Wood Preservers block. Ron Hunter has extensive background in logging and felling and is both a hunter and fisherman. We found both of the WCB staff to be sympathetic to our needs, but firm that their job was to enforce the regulations as they were written. They pointed out that there were 10 logging fatalities last year, five of which were related to felling. Historically a high percentage of logging fatalities are snag-related.

Ron Hunter suggested that we would have a couple of options for the short term:

1) Leave snags in small clumps of trees where snag numbers are high and merchantable timber volume is low, and only fall the snags in those clumps that are considered to be "danger trees", usually those within one tree length of the edge of the clump (WCB regulations are 2 tree lengths from the edge of the clump). He indicated that he might be able to live with this option.

2) Apply to WCB headquarters for a site-specific variance on the regulations. He offered to help us fill out the request but not to expect much success with this route. However, it may be the only way we will be able to retain snags in a selectively-logged block to be logged this winter. As we are looking at several more blocks for next winter, it is an option we will have to take.

Another snag problem that has recently come to our attention is that WCB informed Fletcher Challenge that all snags created by hack-and-squirt had to be slashed and removed after logging. Fletcher Challenge's response was to send out a memo to all staff on January 30 informing them:

> "The preservation and, where possible, the enhancement of wildlife habitat is consistent with our commitment to integrated resource management..."
>
> "The following areas should be identified on 1:50 000 scale history maps along with the total number of snags to be left standing in each cut block. The data generated will be reviewed by the MOE and submitted to WCB prior to snag felling:

1) Trees/snags containing visible nests.

2) Potential habitat areas where small clumps (5-10 trees) can be left or where single large snags can be left for perch and nesting habitat."

> "In identifying candidate areas, the following guidelines should be considered:

1) All nests must be preserved.

2) Aspen and cottonwood are preferred species by cavity nesters because of their relatively soft wood fibre.

3) Many birds (e.g., raptors) not only require the nesting site but also perch on trees in the vicinity of the nest and up to 50 m away.

4) Snags or nesting sites should be evenly distributed over a large geographic area to support maximum populations based on the territorial requirements of individual species.

5) Some bird species require clumps of snags to achieve maximum population levels.

6) A long tree/snag in the center of a cutblock may not be a nesting site but will provide needed perching opportunities for raptors.

"Our primary objective must be to ensure human safety and potentially dangerous snags are to be felled. However, with minimal effort we have the opportunity to enhance wildlife habitat within our respective operating areas."

This document was signed by the Fletcher Challenge silvicultural forester.

We discovered that Mackenzie Forest District does not require the removal of all snags (at least those recently killed by hack-and-squirt herbicides). Fletcher Challenge and Mackenzie Forest District staff have had enough dealings with the local WCB inspector to hope that he will be reasonable in the use of his discretionary powers.

Ron Hunter also informed us that the WCB Regulations are being revised, and that we should be making input into those changes right now.

Provincially, we now have the Wildlife Tree Committee. We discovered the existence of this committee after getting into this matter with caribou habitat.

The Wildlife Tree Committee met for the first time with Workers Compensation Board, Forest Service safety staff and MacMillan Bloedel staff on 7 March, "To discuss the future of wildlife tree guidelines/policy in an integrated fashion with provincial forestry, public interest, Workers Compensation and the Wildlife Branch." Nancy Wilkin can fill you in on what happened at the meeting. After that, I'd like a brief strategy discussion from the floor on where we should be going from her.

Nancy Wilkin: Outlined results of a recent WCB meeting, the WCB is changing the regulations and MOE can prepare a brief stating our concerns. The Wildlife Tree Committee is doing this.

Review of "TRRIMP" (Trench Plan) Methodology

Dennis Hamilton, Habitat Protection Biologist, MOE, Invermere

Background

- MOF was trying to grow trees on areas of low forest productivity (i.e., traditional grassland communities) that usually had high ungulate winter range capability. This combined with forest encroachment on these communities (approx. 1% encroachment per year for the last 40 years) was limiting carrying capacity.
- carrying capacities were declining as capability is constant.
- Christmas tree farms are usually low productivity forest sites but high productivity wildlife (ungulate) sites. The nature of Christmas tree management negates prescribed burning for forage enhancement.

Step 1. Wildlife Species Management Priority Map.

- Ungulate Biophysical Capability for moose, white-tailed deer, elk and sheep. Map scale 1:50 000.
- it is assumed that management for bighorn sheep - a regional priority - will meet elk management needs. Regional species priorities set management objectives in most instances.
- local knowledge - not only present use patterns - were considered but traditional patterns (i.e., some people there had 25 - 30 years experience) were considered but always in the context of biophysical capability.

Step 2. Relate to Forest Cover - Establish Forest Cover % Objectives

- different species require different habitats and habitat requirements with respect to forest cover.
- W1, W2, W3 are not capability ratings but rather species groups based on similar forest cover requirements, i.e., bighorn sheep, mountain goats, mule deer (open grasslands, wind swept south slopes), i.e., white-tailed deer, elk, moose (more cover required).

Step 3. Ministry of Forests Map. Timber and Range Capabilities

- MOF did a 1:50 000 capability map with 3 classes - T1, T2, T3. Range ratings were the inverse of timber ratings.

Step 4. Derivative Map. New polygons with Timber/Wildlife Ratings
- polygon ratings must have consistent capabilities for both wildlife/timber.

Step 5. Management Treatment by Polygon
- although % cover may be substantially different than suggested matrix cover, this was the rare exception rather than the general rule.
- there is a link of this planning level to the operational level. The TRRIMP process identifies areas of potential harvesting, areas requiring delays and areas with low to high conflict with respect to resource integration.

Step 6. TSA Net Downs
- information sent to Victoria for TSA analysis.
- information was digitized within each polygon by MOF.
- % forest cover targets were compared to what was actually there using GIS.
- the 5- and 20-year projections are presently being reviewed.

QUESTIONS

Comment: this process is being taken outside of the Trench.

Q: Is there forest cover percentages?
A: The percentage range is based on what we wanted to do there, e.g., for sheep winter range, we wanted forest cover reduced to 5-15%.

Q: What has happened with AAC in this process?
A: The impacts are being determined in relation to AAC.

Public Involvement and the Mission Creek Spawning Channel

Gordon McKinnon, Habitat Technician, MOE, Penticton

Very few people in Kelowna were aware of the fisheries in the city area.

Q: What is going to be done to sustain public interest?
A: We tried to make it as self-sustaining as possible, e.g., the college is taking over the spawning channel as an educational project. Habitat protection involvement has great value in creating awareness.

Q: Will there be a creel census to identify the improvement?
A: Yes.

B.C. Tel Fiber Optic Line Stream Crossings, A Job Well Done

Judy Teskey, Habitat Protection Technician, MOE, Chilliwack

Last summer I worked on the B.C. Tel Lightguide Transmission System project in the Hope area. The project was extremely successful from an environmental perspective. B.C. Tel was recently awarded the Minister's Environmental Award for their efforts and environmental protection achievements on this project.

My talk is not a construction "How-to" type of presentation. I will outline how this project came together and why I think it succeeded. If you would like construction details, we have a VCR set up with the 12 minute B.C. Tel video "Lightguide Transmission System - Construction in the Mountainous Terrain of B.C." I have some photographs of the river crossings and would be happy to go over them with you later.

The Lightguide Transmission System project involves constructing fibreoptic or lightguide line across Canada. Two major requirements of this construction are that the line must be secure and accessible. The security aspect dictated that the line be buried 1 m in earth, 0.5 m in rock and 3 to 4 m under major rivers.

On 1 December 1987, a meeting was held to describe the project. In my area they proposed 14 buried crossings of the Coquihalla River with completion by Fall 1988. I was in a severe state of shock. The B.C. Tel people said they wanted the project to be completed without damaging the fisheries resource. With visions of the Coquihalla Highway construction in my mind, I thought the B.C. Tel people were extremely naive or were con artists. I was not born yesterday - the project they described could not be built in the time allotted without sacrificing the river.

With our typical Don Quixote attitude, we got to work and tried to subdue this windmill. We looked at the proposed location - B.C. Tel had proposed following Westcoast Energy pipeline right-of-way through the Coquihalla corridor. We stressed the importance of reducing the number of crossings and encouraged them to seek alternatives such as using bridges to avoid buried crossings. Because the fibreoptic line is flexible it can be installed with more frequent and more acute bends than is possible for a gas or oil pipeline. B.C. Tel staff spent 3 months evaluating alternative right-of-ways. They put a lot of work into this - the results were worth the effort. The final route required 7 crossings of the Coquihalla - one on a bridge.

B.C. Tel hired a fisheries consultant to collect resource information and to develop environmental protection measures. Ship Consultants (Ted Harding) was awarded the contract in my area. Ted worked with Mike Miles

to produce six initial fisheries assessment reports for sections of the Lightguide alignment. These reports describe the fisheries resources, inventory all stream crossings, outline potential impacts and recommend mitigation works. Many of the mitigation recommendations were incorporated in the contract documents. These reports are extremely thorough and help guide the environmental monitors and construction contractor during the construction phase.

From the onset of the project, we had specified that environmental monitors would have to be onsite during instream construction. We suggested terms of reference for the environmental monitors and insisted they have the authority to shut works down that were causing or could cause environmental damage. We did not want problems we had encountered with Highways environmental monitors repeated on this project. Monitors were required to keep daily records and to submit weekly reports to fisheries agencies. Monitors were required to contact us if significant problems arose.

Throughout the planning process, B.C. Tel was willing to listen to new ideas and was willing to re-examine decisions they had made. They did not try to have us modify or reduce our requirements for environmental monitors or any of the mitigation conditions. B.C. Tel staff listened to our concerns and really tried to understand our point of view. Both management and field staff seemed seriously committed to completing this project in an exemplary manner.

B.C. Tel sent some of their field staff to the North Fraser Lightguide crossing site to observe and gain experience in large river crossing techniques. Videos from that project were shown to staff in an effort to prepare for the field season.

The cooperation and support of the Lands Branch, especially Margo Elwanibi, helped formalize many of the agreements we had reached with B.C. Tel. The pre-conditions for the Licence of Occupation included all of our environmental protection clauses. It also specified environmental monitors had to be at instream construction sites and that they had the authority to shut down works.

Two contracts to complete the six Coquihalla River crossings were awarded to Majestic Pipeliners. I was apprehensive because of past experiences with them. B.C. Tel stressed the sensitivity of the project and emphasized the environmental protection requirements of the contract documents. During the pre-construction meeting, the role, responsibilities and authority of the environmental monitors were clearly described. We encouraged the construction contractor to contact the monitors, to discuss procedures and to resolve potential problems.

The construction period started and the contractor started placing the large impervious sand bags. Construction of the first crossings took much longer than anticipated and lots of unforeseen problems were encountered. Four crossings were completed utilizing the coffer dam method and two crossings employed large flumes to carry the water over the construction sites. All work was accomplished within our instream work window, without any downstream habitat destruction and without hampering the recreational steelhead fishery. The disturbed river channels were restored to maximize fish habitat and the streambanks were totally revegetated. Because of the efforts of B.C. Tel, Majestic Pipelines, Ship Environmental Consultants, Golder Associates and many others, the project was an unqualified success.

It was always a pleasure to inspect the works - no traumatic catastrophes, no rampant destruction. It was a really pleasant surprise to have the project proceed so well. In the hopes that this success can be repeated, I have listed what I think are the reasons for the project's success.

- The unfailing commitment of B.C. Tel management and field staff to doing the best job possible in an environmentally aware manner.

- B.C. Tel employees emphasized the company's commitment to environmental protection to the construction contractor. B.C. Tel was serious and would not put up with inferior construction methods.

- B.C. Tel inspector plus consulting engineering inspector were at each instream construction site at all times. This close supervision helped keep construction in line.

- Environmental monitor was at each instream construction site at all times. Monitors were not spread too thin - they had time to focus on construction methods and really think about protection measures. Attention to detail really paid off.

- Environmental monitors developed an excellent rapport with construction contractor. The monitors were a part of the project and were resource people that could be used to benefit the contractor. Monitors were part of the team working for a common goal rather than being outside enforcers.

- Monitors were credible - they did not pretend to know all of the answers and often involved the construction contractor in finding the best solution. The construction contractor became part of the solution and wanted it to succeed.

- Monitors were firm but fair. They researched upcoming operations and anticipated potential problems then sought the best solution.

- Monitors were approachable and made themselves available to foremen and machine operators. New and unconventional solutions to problems were evaluated and frequently tried.

- Weekly meetings were held with the construction contractor, environmental monitor, consultant engineer, clearing consultant, B.C. Tel and myself. All problems, incidents, concerns, etc., were discussed in detail. All activities of the previous week were reviewed and a schedule of construction for the next week was presented. Environmental matters were a firm agenda item and were treated as an integral part of the project, not as a requirement or an afterthought.

To summarize - I think the most important factor in the success of this project was the positive attitude and commitment B.C. Tel management and staff displayed to environmental protection.

QUESTIONS

Comment: It should be emphasized the importance of Lands Branch requiring environmental concerns be considered on B.C. Tel's license of occupation.

Q: How difficult is it to be as successful on a river you don't know as well as the Coquihalla?
A: The attitude and planning early is more important than knowing the system well.

Q: Are there extra costs involved?
A: Yes, but I don't have the details.

Comment: Should put this down in a format that can be used elsewhere, eg., guidelines

Action from Last Year's Strategy Sessions: Are We Getting Anywhere?

Linda Foubister, MOE, Victoria

Introduction

At the Habitat Protection meeting last year, strategy sessions were held to develop strategic options in five major areas: Forestry, Mining, Water Allocation, Pesticides and Habitat Management. In addition, a session was held on workshop and training needs. This report will provide an update on these sessions.

One 7 June 1988, the draft 'reports' of the working groups were sent to the Regional Fish and Wildlife Managers and the Directors of Recreational Fisheries and Wildlife. No recommendations were received with respect to the strategies. However, Habitat staff have worked on a number of the items identified at the 1988 Strategy Sessions as follows:

1. Forestry Strategy Session

The major issue discussed last year was the policy change in the Ministry of Forests to assign greater responsibility for forest management of the forest industry - the new era. This has occurred and we now deal directly with the industry. However, the TSA planning process is in limbo, particularly with respect to tree farm licence conversions. No decision on decreasing the Allowable Annual Cut in the Williams Lake TSA has been made by the Chief Forester to date.

In order to do business in the new era, a discussion paper was prepared. The most recent draft, entitled *A Proposal to Delegate Habitat Management Planning to the Forest Industry* (26 October 1988) has been discussed with the Ministry of Forests and no opposition was expressed. Executive level meetings are the next step to approve this. A proposal for government funding to cope with the delegation of management was submitted, but did not receive support. The situation is one of dynamic inaction.

Recommendations from the strategy session last year included the application of guidelines, the requirement for more complete information, use of the *Environment Management Act* and reallocation of responsibilities, staff and effort.

With respect to the application of guidelines, development of the Interior Fish/Forestry guidelines and of Wildlife/Forestry guidelines has been initiated. Amendments to the *Environment Management Act* will not be considered until the delegation discussion paper is finalized. Required changes include the development of regulations and further delegation are required under Section 2. Section 5 is the only section in which authority is delegated to region. However, we can use EMA more than it is being used presently. Finally, no major reallocations of responsibilities, staff and effort have occurred to repriorize our activities.

2. Mining

Issues centred around the burgeoning hard rock mining activity and the opening of the Province to placer mining. Recommendations included development of a proactive approach, ranking of referrals, increasing funding and other agency support, development of placer mining guidelines and procurement of monitoring funds for placer operations.

The Ministry of Environment identified areas in the province where placer mining is unacceptable. As a result, the Ministry of Energy, Mines and Petroleum Resources (MEMPR) did not open the entire province to placer mining; only a portion of the province was opened.

With respect to receiving support, supplemental funding was received related to mining impacts in the north. Headquarters staff are not involved in the review of hard rock mines unless specifically requested by Region or Planning and Assessment.

Placer mining guidelines have been developed and are now in use. A monitoring program by contract was initiated last year with funding of $1/2 million. This program has been continued in this year with increased funding. An evaluation of the first year's program has been done, a training workshop for contract monitors is planned and MEMPR have directed staff to coordinate the program.

3. Water Allocation

Issues were the lack of water management legislation, an unenforceable instream flow policy, attitude problems, no agreed low flow methodology, insufficient data and inadequate funding.

There has been no progress on a new *Water Act*. However, the Water Management Branch (WMB) is interested in making changes to their legislation. MOE had input to WMB's Strategic Plan.

In the spirit of changing attitudes by cooperative activities, a representative from WMB was added to the Fisheries In-stream Committee, together with DFO and Fisheries Program representatives.

The first draft of a report on in-stream flow methodology was sent out at the end of last year. It is still being reviewed by the WMB. A standardized approach has been agreed to by F&W, WMB, and DFO; a workshop will be held pending final agreement.

Greater planning involvement and funding was not achieved. A Treasury Board Submission to evaluate the impact of low flows on fish and to set low flow requirements was prepared but it was not approved by the Ministry Executive.

Storage is being looked at where feasible, through HCF. Under Section 44 of the *Water Act*, the use of reserves of water is being investigated with the agreement of the Directors of Recreational Fisheries and Water Management.

4. Pesticides

Recommendations included the development of guidelines, streamlining the referral process and the requirement for more detailed information from the applicant.

No additional guidelines have been developed. However, the referral system has been streamlined at Headquarters and a new form was introduced to allow regions to comment to Pesticide Control Branch via HQ resulting in time savings. Work is ongoing to put more responsibility on the applicant to provide better information and to provide test data. It was recommended that applicants be charged on a per hectare basis. However, the Ministry has decided to charge applicants on a per application basis instead. Better dose rates and methods are being demanded. Finally, negotiations with the Pesticide Control Branch are underway to improve the application guidelines.

5. Habitat Management (Planning/Evaluation/Monitoring)

The issues identified were wariness of planning processes, the need for evaluation and monitoring and the necessity for salesmanship of habitat. Recommendations included the development of more plans, the preparation of more guidelines and the ranking of referrals, the provision of legislative authority for habitat protection and restructuring of regional operations.

The Wildlife Regional Plans have been written. More guidelines, such as the forestry guidelines discussed earlier, are being developed. Referrals are being ranked and the computerized referral system is functioning. The computerized referral system should serve to free up administrative time to undertake more evaluation and to facilitate record-keeping by providing storage of monitoring data. However, to fully undertake this would require that large areas of other work be ignored. Work has been initiated on developing habitat protection legislation and this type of legislation in other provinces is being reviewed. With respect to marketing, a Communications Plan for Fisheries Habitat will be developed by June/89 and an ad hoc committee set up. Finally, restructuring for fish and wildlife management has not occurred. However, talk evolving from this is on-going.

Workshop/Training Needs

A Habitat Protection Strategy Session has been held for forestry-related issues. Interior Fish/Forestry Guidelines were discussed previously, as were methodologies for determining impact of low flows on fish. A workshop on fluvial forms and processes is under development. Peter Lewis met with UBC staff and others to produce a course outline. Workshops are proposed for the fall of 1989.

With respect to Wildlife/Forestry guidelines, two activities have been undertaken:

1) A compendium of existing guidelines, which includes 60% of the guidelines that have been written, was completed.
2) A workshop was held in Kamloops in November 1988 resulting in a Wildlife Working Report, *Guidelines - How Far Can You Go.*

No workshop on Regional Habitat Mapping was held. A workshop on slope stability/terrain mapping is under development with delivery proposed for winter 89/spring 90.

The Skeena herbicide field studies have been reviewed. A meeting was held in Prince George, June 1988, relating to the assessment of the effects of herbicides on browse. A draft field guide was produced and field-tested in the summer. In January, a meeting between MOE and MOF was held. A second draft was produced and will be field-tested this summer with MOF cooperation to lead to a monitoring protocol between MOE and MOF. Short workshops are planned for regions this summer on the second draft.

With respect to computer training, half day training sessions on the computerized referral system were held in each regional office and a MS DOS course was conducted by John Thornton in connection with most of the a.m. sessions. However, a workshop to demonstrate the scope of available systems was not undertaken nor was a workshop on presentation skills.

Summary

Last year's wrap-up concluded that a "fundamental change is needed in the way we do business". This has not happened. Many of the recommendations made in 1988 required the development of guidelines and progress on this has been good, particularly with respect to forestry. The weakest areas involved legislative changes, funding supplements and reallocation and reorganization. Overall the development of strategies is useful but we must recognize that many decisions are beyond our control. I hope that the strategy session tomorrow will identify strategies that we can implement and lead to increasingly effective ways to do business.

HABITAT THINK TANK

Background

At last year's annual habitat meeting, Jim Walker challenged habitat to work "smarter not harder".

In keeping with that comment, plenary sessions were held at last year's meeting to brainstorm solutions to problems in: forestry, mines, water and pesticides, etc. Linda has given you a progress report on issues identified in those sessions.

It's clear that the process figuring out "smarter not harder" has to be an ongoing task in response to the changing goal posts we work with. It hasn't happened overnight. Yet the session on workload organized by Sandy and held Monday is an important step in that direction. Tomorrow's session "Tank Tank for New Directions in Habitat" is another important step.

Rick Morley, Bruce Pendergast and likewise, Jim Walker and Dave Narver, know that many people in both regions and headquarters have serious concerns about the role of habitat in the Fisheries and Wildlife programs and the Ministry.

Habitat is the cornerstone of integrated resource management. And yet, it has a very low profile - a chronic problem that means people and resources have not been allocated to key habitat functions. Also, due to organizational changes, both within and outside the Ministry, habitat does not function as it should.

Tomorrow's session is designed to help you brainstorm ways to make fundamental changes to improve our effectiveness. We've put a lot of thought into structure of the workshop and how to capture your ideas in an organized fashion. Tomorrow we'll begin by defining problems. Most of the session will be used to work out solutions, recommendations and a primary action plan.

If you are perfectly happy with the way things are going, we especially want you to participate. We want to know what drugs you're on. As for the rest of you, we need your ideas and experience.

Action Points

Sylvia von Schuckmann and Linda Foubister will organize a temporary committee made up of regional and headquarters staff (volunteers) to develop a discussion paper summarizing workshop recommendations to

improve habitat effectiveness and profile. Discussion paper is to be written for program directors and Ministry executive.

QUESTIONS:

The response to issues was sent to Directors and Managers from last year's meeting.

WALKER: The presentations were very positive and you're doing your jobs well.

Yellowpoint Think Tank Summary
6 June 1989

A. Major Problems Identified:

1. Your Own Regional Habitat Section:
- Habitat is not a program: don't set own priorities, no legislation, no separate budget.
- Workload is too high; lack of support staff
- No guidance in ranking of work load
- No time for field work and monitoring
- No time to update knowledge/training/isolation
- Lack of information required to do job.

2. Habitat Headquarters:
- Who are they? What do they offer? What are their roles? What are differences between protection, management, inventory?
- Fisheries vs. wildlife separation still a problem, e.g., different directions, poor coordination on common issues
- Ineffective in increasing funding, i.e., through issue papers
- Poor communication; wildlife is worse
- Requests for regional time; unrealistic deadlines
- Limited support; staff difficult to reach; wildlife is worse.
- Vacancies not filled/staff shortages
- Paper presence; need field presence/experience
- Feedback is slow
- Lack of wildlife program commitment to Habitat

3a. Fisheries Management - Region:
- Lack of support in important issues
- Lack of inventory; poor access to inventory; no data base
- No fisheries habitat and management plans
- Different priorities; no direction with respect to priorities
- Too concerned with stocking & enhancement, vs. protection
- No government sanctioned objectives
- Poor communication

- Attitude that habitat is second

b. Fisheries Management - Headquarters:
- Who are they?
- Poor communication
- Focus is on sportfish, not habitat
- No direction for habitat issues

4a. Wildlife Management - Region:
- Lack of support, e.g., limited inventory, lack of population objectives
- Objectives not habitat driven; don't recognize species diversity
- No teamwork
- Poor communication
- Focus on guides and clients
- Attitude is against integrated use
- Wildlife Management get positive jobs, Habitat only negative
- Weak presence at senior level; no follow up at meetings

b. Wildlife Management - Headquarters:
- Who are they?
- Poor communication
- No direction for habitat issues

5. Conservation Officers:
- Poor communication
- Unwilling to investigate; send Habitat staff instead
- Poor support of requests
- We can't direct their priorities; work plan driven; inflexible
- Difficulty in laying habitat charges

Pesticides:
- Pro-chemical; no vegetation management, just chemical management
- Too much paper generated
- Lack of enforcement
- Lack of staff
- No delegation of authority to regions

Planning & Assessment:
- Who are they?
- Role confusion with Habitat in HQ
- Poor communication
- Demand regional time; interfere with regional program
- Too willing to compromise
- Too political - not resource advocates
- No field presence

- No regional presence
- Lack of support, e.g., economists

Waste Management Branch:
- Legislation-based not management-based; driven by Act
- No enforcement
- What is the role of the Environment Section? Can we use them?

Water Management Branch:
- Lack of recognition of fisheries values
- Reluctant to use Water Act
- Insufficient monitoring

Administration:
- Poor support

6. Ministry of Forests
- Changing policy results in flux and chaos
- Region doesn't follow Victoria initiatives
- No continuity among regions
- Poor morale and high staff turnover
- Low commitment to integrated resource management
- Lack of planning in some regions
- Poor access to MOF information

Ministry of Crown Lands:
- Reduced capability, i.e., loss of surveys and resource mapping and of planning
- Don't incorporate our recommendations
- No feedback
- Politically driven
- No consistency between regions
- Advocates of Crown land alienation

Ministry of Energy, Mines & Petroleum Resources:
- No integrated management
- No enforcement
- Regulatory capture; advocate of industry

Ministry of Parks:
- No integration/communication

Others:

Personnel
- do not support staff, just rules
- not able to move staff around province
- not innovative
- overlapping and inconsistent classifications
- no recruitment of new blood

Regional Directors
- do not provide team direction and motivation

Ministry Executive
- lack of recognition of IRM function
- poor communication
- no feedback
- lack of support to improve personnel support

B. Solutions - What Should Habitat's Role Be?

1. Role in Region
- Be part of team for integrated resource management
- Assume proactive role vs. reactive
- Rank issues to be worked on
- Be more involved in monitoring and assessment
- Increase public awareness

2. Role in Headquarters
- Develop policy and guidelines
- Provide expertise and technology transfer
- Coordinate provincial issues
- Provide technical and professional support to region
- Lobbying; securing funds
- Evaluation
- Direct acceptance of provincial objectives for management

3. Ministry
- Promote higher profile
- Help establish priorities of other Branches in Ministry
- Direct change in legislation
- Enlist industry and clients to accomplish our goals
- Define focus
- Promote and develop land and water ethic

Solutions:

- More leadership by Ministry & Program executive in IRM
- Clearer statement of IRM objectives
- Improve communication
- Regional Director should develop MOE team approach
- Team building
- Create an IRM program
- Increase public and client group support
- Be proactive
- Rank workload; be innovative in reducing work load
- Improve inventory
- Develop habitat legislation and EMA
- Objective of diversity should become operational
- Do problem analysis; what can be changed, what can't?
- Create climate for change; how?

C. **Strategies:**

Improve Communications:

- More effective meetings
- Meet with other sections of Ministry regularly
- Promote informal communication
- HQ should send region trimester reports
- Habitat Newsletter
- A senior steering committee to link programs at regional level

Aim to be more proactive:

- Greater involvement in planning
- Drop referrals without guilt based on priorizations (e.g., forestry)
- Monitor and assessment important
- Do fisheries habitat plans

Better inventory:

- Delegate to industry
- Use/improve Environment Management Act (EMA)
- Request senior level management commitment

Raise Habitat Protection Section Profile:

- Get I&E section in regions
- Hire Public Relations staff
- Get Program status for habitat
- Ride the Environment wave

Training:

- Encourage training and updates for staff

Executive:

- Develop team work
- Define product - fish and wildlife production or environmental quality focus.
- Build esprit de corps, e.g., MOE identification e.g., hat, shirts, belts
- Media relations: use press
- Personnel- work exchanges
  - pay incentives
- Anonymous suggestion boxes for directors

Draft white paper based on the findings of this workshop:

- Explore options: Environmental management, habitat driven, with fish & wildlife in subordinate role
- Reorganize to Ministry of Integrated Resource Management?

Follow-up of white paper:

- Recommend preferred option; analyze downside
- Get J. Walker's and D.Narver's endorsement
- Regional habitat staff meet with Regional Director and Regional Fish and Wildlife Manger to soften ground
- Send paper to regional directors, ADM (Wynn), Ministry Executive.

REGIONAL AND VICTORIA REPORTS

Region	
1	Vancouver Island
2	Lower Mainland
3	Thompson-Nicola Subregion
	Okanagan Subregion
4	Kootenay
5	Caribou Subregion
	Omineca Subregion
	Peace Subregion
6	Skeena
7	Habitat Management Section, Wildlife Branch

REGION 1
ANNUAL REPORT FOR VANCOUVER ISLAND REGION
HABITAT PROTECTION SECTION

1. B.C. Hydro contractors widened the 148 km 230 kv transmission line between Dunsmuir and Gold River to supply additional power to the Canadian Pacific Forest Product's pulp mill in Gold River. Wendy Kaiser, an environmental inspector working for B.C. Hydro provided valuable on-site monitoring to ensure compliance with streamside clearing prescriptions. The new parallel line will be up and charged by mid-July, 1989.

2. The Vancouver Island Resource Manager's Group meeting was held on 3 May 1988. Agenda topics included: Letter of Understanding Implementation Plan meetings, Habitat Fisheries Officers, new silviculture regulations, Forest Licence Integrated Resource Planning, Harvesting Boundary Auditing and Habitat Protection FRDA budget plans.

3. Letter of Understanding Implementation Plan meetings were scheduled in July and early August, during which time the TFL licensees and non-timber resource agencies participated in development of a satisfactory Implementation Plan. The Ministry of Environment and Department of Fisheries and Oceans Guidelines for Referral Procedures became embodied in the new Implementation Plan as a consequence of lengthy, but positive discussions with six licensees and the Forest Service. Once Letters of Understanding are signed on 1 September 1988, the licensees will work directly with Ministry of Environment and Department of Fisheries and Oceans, with the Forest Service acting in an auditing role.

4. All Region 1 Habitat Protection staff participated in a two day in-house workshop to learn wildlife habitat capability classification from Brian Fuhr, formerly of the Wildlife Branch, now Regional Habitat Protection Head, Smithers.

5. As part of the 3-year, 3 million dollar computer modelling project funded by NSERC and industry, staff attended two workshops to provide input to the modelling process. The Managed Stands for Deer Winter Range (MSDWR) project will attempt to model the interaction of Douglas-fir overstory, understory species, microclimate and deer energetics.

6. Peter Olynyk was hired on a 59-day FRDA contract to map land tenure, deer and elk winter ranges and fir plantations for the Arrowsmith, Strathcona and Kingcome TSA's.

7. A 1:50 000 scale planning map for black-tailed deer habitat in the Carmanah watershed was prepared as an overview for MacMillan Bloedel TFL 44. This was supplemental to our more detailed review of Franklin Division's 1:20 000 scale operational harvesting plan wherein the issue of habitat diversity was more readily addressed.

8. A two-day workshop in Kamloops was attended to develop and refine provincial strategies for TSA planning and development of Provincial or regional fisheries and wildlife guidelines.

9. The proposal to expand TFL 19 received preliminary regional review. Net land base and management issues such as cut-block size options, cut/leave patterning patterns, balancing cut between compartments, wildlife visual cover green-up requirements, short-term winter-range or forage block deferrals versus long-term winter-range exclusions, maintenance of water quality, wildlife tree management and diversity needs for fisheries and wildlife are items which must continue to be addressed regardless of TSA or TFL status.

10. Canadian Forest Products have undertaken a second-growth habitat enhancement project adjacent to a deer/elk old-growth winter range as per our recommendations. The 25-year-old stand will be selectively pruned to allow better utilization by wildlife while still maintaining snow interception capability.

11. Habitat's thematic mapping request for Douglas-fir plantations in the Arrowsmith TSA has been given high priority by the Ministry of Forests' Inventory Branch. A set of computer-mapped colour-coded products were completed for all 1:20 000 mapsheet converted to a planning scale of 1:192 000.

12. In response to Scott Paper's expansion of TFL 43 into the Kingcome River Valley and their request for fisheries and wildlife input to their Management and Working Plan, preliminary area deletion of fisheries sensitive zones were completed. These areas are also deemed to be valuable as grizzly bear habitat.

13. As further field testing of the new Coastal Fisheries-Forestry guidelines, regional habitat protection staff met with the silvicultural staff of the Campbell River Forest District to review habitat management prescriptions in streamside forestry situations.

14. In refinement of management guidelines for the Nahmint Watershed Folio, habitat staff negotiated with MacMillan Bloedel, selective removal of some merchantable timber from within the designated Recreational Fishing Corridor. The removal of some large fir which overtop the main forest stand was deemed potentially beneficial to minimize blowdown. Fisheries, wildlife and recreational values were not jeopardized by selective fringe removal along the designated leave strip.

15. On 4 August 1988, development plans for the Comox Harbour Airpark were informally reviewed with Frank Denton of McElhanney Engineering Services, Courtenay. In conjunction with L.J. Foubister of the Recreational Fisheries Branch, Habitat Protection will develop an action plan for enhancing the old sewage lagoon adjacent to the new airstrip. The action plan will then be presented to the Pacific Estuary Conservation Program to investigate potential land purchases in the area to allow enhancement. Fill for the airstrip is currently being added to a portion of the lagoon. Habitat Protection is expecting further discussions with the City of Courtenay in the near future.

16. Shearwater Mapping Limited completed a $12,000.000 FRDA contract for eight 1:50 000 scale wildlife habitat capability maps. The mapsheets covered include the Sayward, Brewster, Quatsino, Mahatta, Port McNeill, Alice Lake, Gold River and Muchalet Lake map sheets.

17. Peter Olnyk was hired as a short-term employee under FRDA funds to produce a silvicultural map for the Arrowsmith TSA delineating all Douglas-fir plantations in the Western Hemlock Biogeoclimatic and Coastal Douglas-fir Biogeoclimatic zones.

18. Alan Nixon was hired as a short-term employee under FRDA funds to revise and update a silvicultural history map and long-term planning strategy to meet wildlife forage and cover needs in the lower Adam River/Newcastle Creek areas.

19. Habitat Protection staff met with MacMillan Bloedel staff from L.U.P.A.T. and the Port McNeill Division to develop and implement a suitable forage and cover planning strategy for elk habitat in the Benson-Raging watershed.

20. A Provincial Wildlife Tree Committee meeting was held to discuss the future of Wildlife Tree guidelines and policy needs in an integrated fashion with the Ministry of Forests, Workers' Compensation Board, the forest industry, public interest and the Wildlife Branch.

21. To improve efficiency of implementing FRDA contracts, Habitat staff attended a three-day Contract Management Course.

22. To maintain fisheries habitat in the lower Cameron River and prevent further downstream impacts from debris movements, the Parks Branch has completed the removal of a major instream debris jam in an area immediately adjacent to Cathedral Grove.

23. Westcoast Transmission was responsible for funding a contractor to assess fisheries sensitive sites for the Vancouver Island Gas Pipeline Route. Inventory has been completed and a stream (line) catalogue will be developed which will identify constraints, prescriptions and methodologies for each crossing.

24. Pesticide referral procedures have been jointly reviewed and revised by Habitat staff and the regional Pesticide Control Manager.

25. All Habitat staff participated in a two-day demonstration course for the Ministry Referral System and Word Perfect software program.

REGION 2
LOWER MAINLAND REGION
HABITAT PROTECTION SECTION
ANNUAL REPORT

1 April 1988 - 31 March 1989

Administration

Talk about doing things in a hurry, Susan Latimer (now Susan Hammerl) was married and had a baby all in the same year. Even more astounding is that Sue had her baby less than a week after she left on maternity leave.

The referral workload in the Lower Mainland continues to grow and grows with no end in sight. Urban development is occurring at an unprecedented rate, particularly in Surrey, Coquitlam, Maple Ridge, Port Moody, Mission and Langley. Lorna Dur an alone reviewed and commented on 500 municipal subdivisions ir 1988. Moreover, the change in the way the Ministry of Forests is doing business has added dramatically to the workload of Habitat staff. We desperately need help and yet it doesn't seem to be forthcoming. Instead, we're told to priorize. We've already priorized to the extent that we're only working on our highest priorities and many of them aren't getting done. We need more staff and if it doesn't happen soon, we're going to lose some very valuable and experienced employees.

If the longevity of Regional Fish and Wildlife Managers in the Lower Mainland is any indication of our stress level, we must be very close to the breaking point! Tom Wood left last summer, Tom Burgess was acting for about six months and now Ken Lambertson is acting until the position is filled on a permanent basis. With so many changes at the top, it's unsettling for the troops and doesn't allow for any continuity.

Two significant sick leaves and one extended annual leave resulted in Habitat Protection Section's workload and referral backlog being exacerbated for much of the third trimester.

FRDA monies permitted the hiring of Steve Gordon on a STE contract to monitor herbicides and perform other forestry functions during February and March. During this period, Debbie Williams, hired on an STE OA2 position, managed to eliminate the large filing backlog for HP section.

The Ministry Referral System training seminar was presented by Dennis McMillan on January 12 and 13. Following this, regional HP staff started to log referrals onto the computer. However, after a few months of operation several glitches, some serious, have emerged.

John Fee was the successful candidate in a competition to replace Susan Hammerl while she is on maternity leave. John started on 27th February and is likely to be with us for about 6 months.

The Acting Regional Manager and Section Heads have been reviewing workload priorities to determine how Region can internally supplement Habitat Protection's efforts at handling a sharp increase in referrals. A mechanism for improved screening and priority selection of referrals has been under consideration.

Forestry

A Fish and Wildlife Management Rationale Statement was presented to the Soo TSA Steering Committee. Subsequently, we requested an AAC reduction for deer winter range during a meeting of the Yield Analysis Subcommittee. It was decided that, for AAC calculation purposes, the EW 2 hectares necessary for deer habitat will be calculated at a 50% ratio, but yet all hectares will be labelled as EW on forest cover maps.

Forestry/fisheries interactions continue to have ups and downs. A licensee in the Homathko River has agreed to undertake remedial works necessitated by poor logging and road building practices in the past years. Meanwhile, a Forest Service small business road construction program resulted in heavy siltation and other habitat damage in the Peers Creek drainage. All this after onsite consultations with Forest Service personnel, in which water quality concerns and construction methods were discussed.

Forestry/wildlife interactions were prominent throughout the year. A pilot project involving deer winter range creation on Fort Mountain will be undertaken this year to determine costs associated with manipulating young stands. An old-growth alluvial stand on the Homathko River was reserved from harvesting after grizzly bear use on the block was rated moderate to high. Similar issues involving grizzly bears may develop on the Toba River drainage as timber harvesting will soon be resumed there. A mountain goat wintering habitat, timber harvesting issue in the Smanit Creek drainage was satisfactorily resolved.

Staff met in Squamish with Weldwood of Canada Ltd. to view and receive their 5-year development plan for TFL 38. This is the first implementation of the Letter of Understanding for TFL tenures in the Lower Mainland Region. Weldwood also gave us their 5-year development plan for FL A19211, although the Letter of Understanding for FL's has not been finalized by Ministry of Forests.

Staff reviewed plans for several drainages in MacMillan Bloedel Ltd.'s TFL 39. A major conflict with goat range in a Phillips River tributary is brewing.

Meetings with Forest Service and licensees were attended in order to formulate Letters of Understanding Implementation Plans for TFL's 43 and 26, and the GVRD's TFL. Field inspection of Weldwood's TFL 10 in the Toba River resulted in numerous changes to their 5-year plan, to protect fish spawning and grizzly bear habitat.

Staff attended the Fraser TSA Steering Committee meeting to discuss a recent application for broadleafed timber. Ministry of Forests was prepared to approve this application without referral to other agencies. We outlined our concerns for inclusion of this cut in the AAC calculation and the need to protect fish and wildlife habitat.

An initial review of International Forest Products Ltd.'s 5-year plan for FL A19224 in the Homathko River has revealed that there could be serious conflicts with grizzly bear habitat.

Staff reviewed chapter on format and implementation for the Deer and Elk IWIFR Handbook, which is due to be completed sometime this winter. Also, met with Cheryl Ray of the Ministry of Forests Research regarding the second round of IWIFR workshops, which are designed to inform field staff of the latest research results.

Work continued on the compilation of moose habitat use data collected last spring in the Elaho Valley, near Squamish, B.C. The results of this compilation will be used to provide wildlife input to future logging developments in the drainage.

Deer browse enhancement activities were continued on two heavily used winter ranges near Pemberton, B.C. during this period. To date, a report has been prepared to document enhancement strategies for the area. In addition, a consultant has been contracted to locate specific sites in the field for mechanical treatment.

Urban Development

Maple Ridge Municipality passed a new bylaw that is making enforcement of subdivision conditions much easier for all parties. The bylaw states minimum lot depths to covenant boundaries based on zoning and lot densities.

Staff provided comments on revisions to the Mission Official Community Plan and suggested that more emphasis be placed on stream protection.

Staff continued efforts to ensure that residential developers comply with our requirements as there remains a serious lack of sediment control and treatment on many sites.

Staff have been reviewing Phase 2 of a 52 ha residential sub-division development on Westwood Plateau, within the Hoy Creek drainage. This is a massive development where the potential impacts on the fisheries resources of Hoy and Scott Creeks, two of the most important tributaries of the Coquitlam River, are major concerns. The developer did not meet deadlines for hydroseeding unstable slopes, and heavy rains caused slumping in many areas. In addition, settling ponds weren't acted upon. As a result, a new settling pond plan has been devised that includes five additional ponds. Silt fences have been installed at the base of fill slopes and slopes have been temporarily covered with polyethylene to reduce erosion.

Storm Drain Marking Program under the supervision of B.C. Conservation Foundation's Tony Barnard continues. Excellent progress has been made toward providing volunteer coordinators with standardized instructions and equipment. New coordinators have been set up in several new areas, a newsletter has been initiated and resource information is being put together for volunteers.

Linear Development

Staff reviewed and commented on plans for Phase 3 of the Greater Vancouver Water District watermain from Coquitlam Lake. Concerns regarding sediment control and hiring of an environmental consultant were forwarded. An onsite was held with the GVWD, engineering consultant, and the environmental consultant to walk the corridor and identify areas of concern.

Staff also provided input through the Planning and Assessment Branch, and directly to related consultants, on the BCUC Review of the proposed natural gas pipeline to Vancouver Island. It appears as if this project may finally make it off the drawing board and become a reality. It will stress Habitat Protection staff to the max as the time frame for project review is very short. They want to start construction early this summer.

The B.C. Telephone Lightguide Fibreoptics project was constructed in the Fraser Valley and the Coquihalla. Fortunately, B.C. Telephone was extremely cooperative and hired environmental consultants and hydrological experts to provide them with the best advice. At our request, environmental monitors were hired to oversee the construction phase. The work was completed virtually without a hitch. All crossing sites were planted with native deciduous trees and shrubs. Hydroseeding of all disturbed right-of-ways was completed. B.C. Tel and all of their contractors did an outstanding job on this

project. So much so that they received an environmental award from our Minister.

Estuary/Foreshore Development

Considerable effort continued to be spent on the Fraser River Estuary Management Program through ongoing involvement in the Coordinated Project Review process and several sector-based, estuary-wide planning activities (e.g., Habitat Management Activity Program). Order-in-Council 908 (mandatory EIA of outer Fraser Delta proposals) reviews by staff included a proposed marina near the Tsawwassen ferry terminal and a related public meeting chaired by the Acting Regional Manager. Another OIC 908 review of the proposed Steveston North Jetty Realignment, which also included a public meeting, recommended conditional approval of the proposal. Conditions of approval include ensuring juvenile passage to Sturgeon Bank, a review of habitat replacement opportunities, and a 3-year monitoring program.

Several office meetings and an onsite meeting involving the Squamish Estuary Assessment Committee (SEAC) were held during the year. The purpose of these meetings was to discuss and review a proposal put forward by B.C. Rail regarding industrial development in the Squamish estuary. SEAC subsequently proposed that the existing railway line to the Squamish Terminals port site be the general dividing line between industrial areas (to the east) and conservation areas (to the west).

Howe Sound Pulp and Paper has started an ambitious one billion dollar modernization and expansion plan at their Port Mellon mill. Part of the work involves preparation, excavation and stockpiling of one million cubic metres of material. Habitat staff are addressing fill stability and water quality concerns in Mohawk Creek, McNair Creek, Dakota Creek and the Rainy River.

Water Extraction

Staff prepared a priorized list of Lower Mainland streams on which we would like to see minimum flows established. This was in response to positive overtures made to Fish and Wildlife by Water Management (Victoria). Once established, the minimum flow would bind Water Management to monitoring this flow and thus prevent over-subscription. The priorizing process entailed using current flow status information on streams (information from Fraser/Delta Strategic Plan) as well as fishery values on these streams.

Miscellaneous

Court action against the District of Chilliwack was initiated and concluded during this trimester. Habitat damage consisted of the removal of all the streambank vegetation along a 1.2 km section of the Little Chilliwack River. The judge found the District guilty and strongly supported the concept of closer consultation between the District and Fisheries agencies.

Assistance was provided for the planning, organization and implementation of GVRD's Fraser River Festival '88. Over 10,000 people attended, indicating a substantial interest in the Fraser River environment. We are, as a result, planning for much greater involvement in the event for 1989.

Susan Hammerl attended the International Erosion Control Conference as well as a 1-day course in Vancouver.

REGION 3
THOMPSON-NICOLA SUBREGION
ANNUAL REPORT to YELLOWPOINT

Ministry of Transportation - Coquihalla Phase III (Merritt-Peachland)

The original four lane was downsized to two lanes as the result of the original cost overruns. However, there is a renewed political push back to four laning and fast tracking to a 1992 completion date. Wildlife exclusion fencing, underpasses and one way gates have essentially been perfected to a level that we now have working models. Kathy Stuart is available for short term loan to regions considering major new road initiatives.

Lands Branch

Lands have made a decision to sell lakeshore leases to preserve leaseholders. This involves cabin sites and fish camps. Incidentally, fish camp operators are actively pursuing some sort of control over public sites that they consider to be in competition with their operation.

B.C. Hydro

Has adopted a policy of buying privately generated electricity. This has resulted in many water applications for storage and hydroelectric structures. We understand these are being held in abeyance by water management B.C. while B.C. Hydro does some preliminary screening. We await having to comment on a large number of "screened" applications.

B.C. Telephone

They are actively building a province-wide fibreoptic line that involves clearing of a 10-m (minimum) wide corridor and crossing hundreds of major and minor watercourses. They have fully cooperated by hiring good consultants to do preliminary inventory and construction planning with us acting as reviewers only. They have hired good construction monitors who oversee the environmental concerns during construction.

Energy and Mines

Mine Review Process: Reviewed five prospectus and Stage I reports, only 2 went onto the Phase III on the first track process.

Placer: DFO and MOE in Region 3 set up a task force to examine Mines' 1988 proposal to expand Placer areas. There was good support from local mines

inspector but he did not sign the final regional proposal that allowed or disallowed placer operation by general area rather than a stream by stream prohibition.

Forestry

PHSP's and L.o.U's have created a major workload. This has been especially true in February and March with both Forestry and companies trying to beat an 1 April deadline.

PHSP: We perceive a problem with PHSP's in that by reviewing a PHSP we may be absolving a company of the "due diligence" clause out, i.e., if we have reviewed a PHSP and it is logged as per the PHSP but something goes wrong such as a washout, etc. We fear that the MOE may be seen as the goat because we did not pick up a problem in the PHSP.

Because of this fear, the Habitat Section no longer signs ministry referral responses. These are now drafted and signed for the Director only if we feel comfortable that nothing can go wrong.

If we feel that our response is inadequate because of time constraints, we then draft a letter for Regional Directors personal signature and accompany this draft with a memo re our concern.

If our or their inventory is not adequate or we do not have time we reply to the company (within 30 days) telling them of the shortcomings of their PHSP or that a field trip is necessary.

This is our attempt to indicate staff level inadequacies and to have companies accept an inventory responsibility.

Letters of Understanding (L.o.U.'s)

Attendance at Forestry-Industry L.o.U. meetings took an exorbitant amount of time during January, February and March of 1989. After all these meetings, only two companies have signed agreements and it seems the process has stalled awaiting the resolution of the TFL conversion process.

FRDA Funding

A contract to review all FRDA funded silviculture projects has allowed us to do an adequate job on review of these projects.

Through STE backfill we were able to map our fish and wildlife inventory for two forest districts.

We have begun to radio collar bighorn sheep whose habitat was previously poorly accessed but is presently under heavy mountain pine beetle attack. We are attempting to find and map migration routes, lambing areas, winter ranges to allow us to develop a habitat protection action plan in anticipation of the salvage logging.

Wildlife Planning

Habitat portions still not completed and remains a low regional priority.

Land Acquisition Activities

Section has provided incentive and groundwork on all fish and wildlife land acquisition activities in region.

A major piece of Salmon Arm Bay foreshore has been purchased and is proving to be the seed for a massive nature conservation activity on the Salmon Arm Bay foreshore. See Doug Jury's talk.

We (Phil) has been very active in developing Section 12 reserves as a way of first line habitat protection against alienation. These are especially useful in dealing with elk, moose, sheep and waterfowl habitats.

We have been the main instigators in developing three major access points on the Thompson River.

Special Planning Areas

We have been actively dropping out of CRMP's and other historic plan reviews unless the particular plan was originated by fish and wildlife or is giving us real benefits.

*"This year there were 69 CRMP annual reviews in our subregion and these are usually one day meetings."

Submitted by:

Sandy MacDonald, Phil Homan and Kathy Stuart.

REGION 3
OKANAGAN SUBREGION
HABITAT PROTECTION SECTION
ANNUAL REPORT

The Okanagan continues to address mountain pine beetle salvage operations. The beetles have spread to the east into the Kettle Granby. We have developed proactive plans in a number of areas that have susceptible pine and potential conflicts with fish and wildlife. Corridors in riparian areas have been mapped in the Cochrane, Grano, Hellroarer, the Upper Kettle River and Stiring Creek watersheds.

PHSP's and 5-year development plan referrals have increased significantly, particularly PHSP's. We have been working with Forest Licences and Ministry of Forest to draft an acceptable format for both. Similarly, our involvement with L.O.U.'s has also been a major time commitment.

Input to the Merritt and Boundary TSA's continues.

Two winter range protection plans (East Granby and South Fork) were completed under FRDA. These plans address logging, intensive silviculture, maintenance and enhancement. A westside Winter Range Plan was completed and will guide Habitat Protection over the next 5 years.

We are currently preparing a deer enhancement plan for Drought Mountain. One of the forest licensees has agreed to log an area to our specification to enhance forage production. It is our intention to work with the licensee to enhance a significant portion of the winter range through logging. This will be a good example of integrated resource management and will assist us in mitigating the impact of the Okanagan Connector.

The Okanagan Connector (Phase III Coquihalla) continues to demand a lot of our time. Construction has escalated in order to meet the 1990 completion date set by government. This highway has incorporated numerous wildlife mitigate structures including exclusion fencing and wildlife crossing structures.

The Okanagan Resource Guidelines remain with Ministry of Forests, no decision has been made on an implementation data. Guidelines are necessary if we are serious about efficient use of staff and integrated resource management in provincial forests.

Four fish kills were examined, three of which resulted from licenced water extraction (McDougall, Bessette and Trout Creeks) and one was a natural occurrence.

Habitat also completed five HCF projects this fiscal, four in fisheries and one in wildlife. We also coordinated one PCAF project, and 2 enhancement projects using VIC section 38 crews and another using displaced highways crews.

- Wilkinson underburn, Fletcher Creek burn, planning and preparation for McRae Creek.

- Moose winter range capability mapping was completed for two mapsheets. Work completed via FRDA contract.

Submitted by:

D.L. Jones, R.P. Bio., Habitat Section Head, Recreational Fisheries and Wildlife Management Programs.

REGION 4
KOOTENAY REGION
ANNUAL REPORT

The main efforts of the Habitat Section continued to be centred on forestry issues. Of particular note were Letters of Understanding and TSA planning. Two L.O.U.'s were signed prior to an opportunity for our input concerning the implementation aspects. Subsequently, upon reviewing implementation aspects of this agreement with senior MOF regional personnel it was discovered that deficiencies also existed from a MOF perspective. Improvements are on-going. Additionally, one major TFL licensee recently submitted a notice to withdraw from their L.O.U., while many other licensees are being directed by MOF to operate as if they had one, although they don't. The attendant increase in workloads and our lack of resources to meet licensees' demands and expectations (some unrealistic) are also becoming manifest.

TSA planning continued in all six districts. Logging guidelines and mapping criteria were developed for the Habitat Classes identified in the Habitat component of the Regional Wildlife Plan. This information was provided to MOF and one TFL licensee to enable them to map the habitats and to calculate the effects on timber availability in connection with TSA plans and TFL Management Guidelines developed by MOF are causing quite a "stir" among forest licensees and environmental groups/Watershed Alliances. Their reactions are essentially diametrically opposed while MOF's position is that the guidelines should be implemented on a trial basis. There are significant implications to wildlife habitat associated with Visual Management and concern that wildlife habitat productivity may be compromised to meet visual quality objectives.

The Habitat Section also increased their efforts on mining issues in connection with expanded placer and mineral operations and continuing developments in the coal block. Communication with MEMPR continues to improve as a result of Regional Advisory Committees and joint field inspections.

Rob Neil was welcomed into the Habitat Section. Rob has taken over Doug Martin's previous functions allowing Doug to address coal block issues.

REGION 5
NORTHERN INTERIOR REGION - PRINCE GEORGE
Report of the Habitat Annual Meeting - April 1989

All in all it has been an extremely busy year with more work and demands than ever before. There were few things to be really positive about, but here goes:

- The technicians FINALLY received their reclassifications and substantial pay increases first promised almost 20 years ago.
- Not only did we get MRS up and running but seem to have convinced the powers that be, that unless there is a person to run it, it won't be of much assistance; thus we now have a referrals clerk.
- We have a regional manager and an administration manager who are doing credible jobs and providing real assistance.
- Stevenson managed to spend an enjoyable month in northern Europe partly paid for by government.
- The Mackenzie TFL application by Fletcher-Challenge (and all other similar applications) have been placed on hold pending further review by government.
- We (MOE) managed to convince the Gold Commissioner not to open the whole province up to placer mining. We also managed to convince Mines to improve guidelines and regulations for placer mining. Bill Arthur played a substantial role in both matters.
- We managed to establish several new wildlife reserves in part because of very good relations with Crown Lands.
- BC Tel's Lightguide project has gone very well, with much of the credit to the innovative and positive attitude of the company.
- We were reasonably happy with the work of the Pesticide Branch Contractor but that was because we directed his activities (it took a lot of time) as there was no Pesticide Control Branch staff in Prince George last summer. Also we had a very good contractor.
- We had a successful prosecution against N.O.M. over a poor logging show. The same company is back in court on another case.....

I don't really wish to dwell on the negative but forest harvesting plans, small business enterprise plans, silviculture plans and TSA plans have been a real bummer all year. We need 2 or 3 more staff to do justice to all these plans and the referrals received. Many referrals are not being processed. The silvicultural plans have been a particular headache as much of what one gains through the harvesting plans can be lost, or at least compromised, by silviculture activities. I almost hope the FRDA agreement is not renewed as our losses due to FRDA projects are not accounted for by the monies we get from the Program.

Despite all the words to the contrary, forests are still being managed for the trees. Perhaps we might see a change in the future as the credibility of forest management is very low in the eyes of the public. The low credibility is partly due to the fact that forests are being managed primarily for trees. If there is an FRDA II much more emphasis needs to be placed on other resource values. Major expansion of forestry operations into new areas, especially the Takla-Sustut and north of Lake Williston, have also caused problems as inventory is sorely lacking but we know there are substantial fisheries and wildlife values. The Wildlife Section is having a real problem with hunting regulations too.

We were not happy with the job done by the Mines Branch placer mining contract inspector. But to be fair, the project started late and there were a lot of growing pains. We hope for better in 1990. Enough!!

Dave King
Regional Habitat Biologist
Northern Interior Region

REGION 6
WHAT'S NEW IN SKEENA REGION HABITAT
ANNUAL REPORT - YELLOWPOINT - APRIL 1989

Everything is new! A new Region, new Director, new Manager, new staff, new ideas, etc., all to address the same old problems and be caught by the same old pitfalls. That's why four of us are at Yellowpoint!

Staff now includes:

Director:	Dick Anderson
Manager:	Tom Chamberlin
Section Head:	Brian Fuhr
Biologist:	Gordon Wolfe
Biologist:	Lorne McIntosh
Technician:	Phil Belliveau
Technician:	Anne Hetherington

The past year was only a part of a year for all but Gord who has so much experience in the Region (nearly 3 years), it was not necessary for him to attend. We spent considerable time getting settled and doing all those good things with Personnel Services, Administration, Vehicle Management, BCBC, and a flurry of staff training courses that we all enjoy.

Northern Mine Review included various stages of review of 14 developing mines, not the least of which include Cinola, Golden Bear and Windy Craggy. We survived these reviews only because of a Northern Mine Review budget which provided funds for travel, aircraft and consultants' studies. Travel costs are a killer here (for example, a round trip commercial ticket Smithers to Whitehorse costs $1200), and if the cost doesn't get you, the travel time will. Northern Mine Review funded two important habitat inventory studies: Wildlife Habitat Mapping of three 1:250 000 scale map areas; and the Taku Aquatic Biophysical covering about twenty-eight 1:50 000 scale map areas. These studies will assist future project reviews, but we still have huge areas with little or no inventory information. Inventory remains a high priority.

FRDA projects included further studies and a new report by Ruth Lloyd on herbicide treatment effects on moose forage, flights in bark beetle and herbicide treatment areas, chronological mapping of timber harvest and silvicultural activities on the Queen Charlottes and habitat inventory studies in the Sustut, Sutherland, Babine and Entiako planning areas.

Major Development Review is dominated by the Kemano Completion Project which will continue for some time. The Habitat Section Head is the

window to Environment for the proponent and consultant (to throw rocks at).

Current Local Resource Use Plans include the Babine, Sutherland and Sustut (the good, the bad and the ugly - remembering that good is only relative). These, and three other LRUP's underway are a high priority and we are making progress in some areas. We are also learning a great deal about human nature, politics and public involvement.

Crown Lands, Placer Mining, the Northwest Reclamation Advisory Committee, Highways, Regional Development, Agriculture and Fisheries, Regional Districts and many others are alive and well in Skeena, but do not get a very high priority since their ad hoc methods of operation would swamp us in short order if we let them.

Proactive MOE initiatives have been given a high priority, for example: FFIP, CFFG, regional wildlife plan and the Bulkley sub-regional moose plan.

Referral responses now meet the 30-day turnaround with the MRS in full use. This system needs some fine-tuning, but is an improvement over past methods. Skeena processes about 2400 referrals per year.

A workload analysis of habitat is underway, with the intent to better address issues rather than specifics. Note that our workload includes:

- 3 regional MOF offices
- 11 District MOF and TSA plans
- 7 TFL holders and MW plans
- 42 FL holders
- 6 LRUPs
- 14 developing mines
- several major developments
- other agencies
- MOE responsibilities, etc.

It is clear that five staff cannot effectively handle this, especially considering the travel time required. We could not operate without supplemental budgets such as FRDA (three times our regular budget) and Northern Mine Review (five times our regular budget). Additional funds help, but staff time is the major limiting factor. Something has to go, or we will. At last we have a regional manager to help solve all these problems. I am looking forward to next year's annual report!

Submitted by:

Brian Fuhr, Regional Habitat Biologist, Skeena Region.

7. Habitat Management Section Wildlife Branch, Victoria

Habitat Management

A major goal of the Wildlife program is to ensure the maintenance of species diversity throughout the province. This role is addressed mainly by ensuring that wildlife habitat is protected and when necessary, secured and enhanced. To meet this end, the Section addresses five major functions:

1) habitat protection
2) land management
3) planning
4) wildlife viewing, and
5) fund administration

Habitat Protection

The processing of more than 20 000 resource development plans referred to regional offices from other agencies each year was partly computerized.

A provincial workshop launched work on a set of wildlife forestry guidelines by collating existing guidelines. The guidelines will help regional staff expedite input to forest plans.

Land Management

A system plan for designation of Wildlife Management Areas was prepared for Cabinet approval and a computerized land record system was set up.

A total of 2509 ha of critical habitat was purchased for $575 000.

The Pacific Estuary Conservation Program, a cooperative plan to acquire and enhance coastal wetlands, was set up in 1987 in conjunction with the Nature Trust of British Columbia, Ducks Unlimited Canada, and Wildlife Habitat Canada. The Program subsequently has acquired 575 ha of estuarine habitat and has assisted in obtaining conservation designation for nearly 7000 ha of Crown land.

Planning

Regional Wildlife Plans have been completed for 10 Wildlife Sub-regions. First drafts are completed for many new Provincial Species Plans. The first draft of the Provincial Wildlife Stratregy is completed.

Wildlife Viewing

A major new initiative on Wildlife Viewing was established. An inter-agency committee was set up with representatives of the Ministries of Parks, Tourism and Forestry, as well as a public advisory committee with representatives of the Federation of B.C. Naturalists, B.C. Wildlife Federation, Guide Outfitters Association of B.C. and the Council of Forest Industries. Plans have been completed for 14 potential viewing areas. Development of these areas will proceed in 1990. In addition, a marketing strategy, outlining the program's visual identity and expected wildlife viewing information and promotion products will be released at the end of 1989.

Habitat Conservation Fund

The Habitat Conservation Fund received revenue totalling $1.5 million from licence surcharges and other sources. Over 100 projects to enhance fish and wildlife habitat were completed at a cost of $2 million, both figures again surpassing previous records.

Public Conservation Assistance Fund

The Public Conservation Assistance Fund aided 44 projects in a variety of conservation, wildlife and fisheries areas, providing a total of $100 000 to clubs and individuals throughout the province. The agreement with Wildlife Habitat Canada to supplement the fund by an additional $50 000 was continued.

Wildlife Working Reports should not be cited because of the preliminary nature of the data they contain

WR-1 Progress report - coastal grizzly research project: Year 1. A.N. Hamilton. First printed October 1984, revised October 1986. 32pp. (Also printed as WHR-9).

WR-2 Progress report - year 2 - 1983, working plan - year 3 - 1984. Coastal grizzly research project. A.N. Hamilton and W.R. Archibald. First printed October 1984, revised October 1986. 32pp. (Also printed as WHR-10).

WR-3 Telemetry: comments and suggestions from the coastal grizzly project 1983. A.E. Derocher. October 1984. (Also printed as WHR-11).

WR-4 Habitat types of the Kimsquit River estuary. C. Clement. October 1984. 27pp. (Also printed as WHR-12).

WR-5 Biogeoclimatic units and ecosystem associations of the Kimsquit drainage. C. Clement. October 1984. 93pp. (Also printed as WHR-13).

WR-6 Kechika Enhancement Project of northeastern B.C.: wolf/ungulate management. 1983-84 annual report. J.P. Elliott. October 1984. 25pp.

WR-7 Muskwa Project working plan. J.P. Elliott. December 1984. 32pp.

WR-8 Muskwa Wolf Management Project of northeastern B.C. 1983-84 annual report. J.P. Elliott. December 1984. 23pp.

WR-9 Kechika Enhancement Project of northeastern B.C.. Revised working plan for 1984-87. J.P. Elliott. December 1984. 12pp.

WR-10 Home on the range: how to cook an urban goose. W.T. Munro, R.T. Sterling, and M.D. Noble. February 1985. 19pp.

WR-11 Effect of wolf control on black-tailed deer in the Nimpkish Valley on Vancouver Island. Progress report -1983 August 31 to 1984 August 31. K. Atkinson and D. Janz. March 1985. 22pp.

WR-12 1983 southeastern Skeena regional moose abundance and composition survey. B. van Drimmelen. June 1985. 47pp.

WR-13 Kechika Enhancement Project of northeastern B.C.: wolf/ungulate management. 1984-85 annual report. J.P. Elliott. September 1985. 28pp.

WR-14 Muskwa Wolf Management Project of northeastern B.C. 1984-85 annual report. J.P. Elliott. September 1985. 44pp.

WR-15 Caribou habitat use on the Level Mountain and Horseranch ranges, British Columbia. M.A. Fenger, D.S. Eastman, C.J. Clement, and R.E. Page. 1986. 41pp + 4 maps. (Also printed as Surveys and Resource Mapping Branch Working Report WR-8).

WR-16 Working plan - coastal grizzly research project. W.R. Archibald and A.N. Hamilton. October 1985. 27pp. (Also printed as WHR-21).

WR-17 Progress report - year 3 - 1984, working plan - year 4 - 1985. Coastal grizzly research project. W.R. Archibald, A.N. Hamilton, and E. Lofroth. October 1985. 65pp. (Also printed as WHR-22).

WR-18 Morice biophysical study, 93L/SW. B. Fuhr, M. Fenger, L. Lacelle, R. Marsh, and M. Rafiq. March 1986. 63pp + 9 maps.

WR-19 Effect of wolf control on black-tailed deer in the Nimpkish Valley on Vancouver Island. Progress report - 1984 August 31 to 1985 August 31. K. Atkinson and D.W. Janz. March 1986. 27pp.

WR-20 Kechika Enhancement Project of northeastern B.C.: wolf/ungulate management. 1985-86 annual report. J.P. Elliott. December 1986. 17pp.

WR-21 Muskwa Wolf Management Project of northeastern B.C. 1985-86 annual report. J.P. Elliott. December 1986. 15pp.

WR-22 Progress report - year 4 - 1985, working plan - year 5 - 1986. Coastal grizzly research project. A.N. Hamilton, W.R. Archibald, and E. Lofroth. February 1987. 90pp. (Also printed as WHR-26).

WR-23 Critical habitat of caribou (*Rangifer tarandus caribou*) in the mountains of southern British Columbia. K. Simpson, K. Hebert, and G.P. Woods. February 1987. 13pp.

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WR-24 Impacts of a hydro-electric reservoir on populations of caribou and grizzly bear in southern British Columbia. K. Simpson. February 1987. 40pp.

WR-25 The effects of snowmobiling on winter range use by mountain caribou. K. Simpson. February 1987. 15pp.

WR-26 Quesnel Highlands wolf control project. D. Hebert. January 1987. 10pp.

WR-27 Muskwa Wolf Management Project of northeastern B.C. 1986-87 annual report. J.P. Elliott. April 1987. 20pp.

WR-28 Vancouver Island wolf control project. Year 1 progress report. D. Janz. July 1987.

WR-29 Habitat survey of the Mackenzie Heritage Trail corridor. V. Hignett. June 1987. 21pp + 5 maps.

WR-30 A proposal to manage coyote and cougar populations of the Junction Wildlife Management Area. D. Hebert. September 1987. 11pp.

WR-31 Wildlife habitat suitability of the Mackenzie Heritage Trail corridor. V. Hignett. May 1988. 16pp + 6 maps.

WR-32 Research priorities for furbearers in British Columbia. D. Blood. June 1988. 49pp.

WR-33 Electrically triggered drop net to capture wild sheep. J.W. Hirsch. 1988. 18pp.

WR-34 A lynx management strategy for British Columbia. D.F. Hatler. July 1988. 121pp.

WR-35 Causes of bighorn sheep mortality and dieoffs - literature review. H.M. Schwantje. April 1988. 54pp.

WR-36 Explanatory legend for vegetation maps of the Kamloops Lake bio-physical study area. E.C. Lea. December 1988. 78pp.

WR-37 Bio-physical habitat units and interpretations for moose use of the upper Cariboo River Wildlife Management Area. E.C. Lea, T. Vold, J. Young, M. Beets, D. Blower, J. Youds, A. Roberts. December 1988. 24pp.

WR-38 Grizzly bear habitat of the Flathead River area: expanded legend. E.C. Lea, B.L. Fuhr, and L.E.H. Lacelle. December 1988. 24pp.

WR-39 Managing habitat through guidelines: How far can you go? M. Fenger and V. Stevens, eds. February 1989.

WR-40 Wolf-prey dynamics. Proceedings of a symposium sponsored by B.C. Ministry of Environment, Wildlife Branch, Faculty of Forestry, University of British Columbia and the Northwest Wildlife Preservation Society. February 1989.

WR-41 Caribou research and management in B.C.: proceedings of a workshop. R.Page, ed. November 1988. (Also printed as WHR-27)

WR-42 Trapping in British Columbia - a survey. R. Reid. January 1989.

WR-43 Biophysical habitat units of the Lower Halfway study area: expanded legend. E.C. Lea and L.E.H. Lacelle. December 1989. 33pp.

WR-44 Long range habitat planning: proceedings. M. Fenger and V. Stevens, eds. March 1990. 49pp.

WR-45 Biophysical habitat units of the Mosley Creek study area: expanded legend and interpretations. E.C. Lea and R.C. Kowall. March 1990.

WR-46 Habitat Management Section. Annual General Meeting. Yellowpoint Lodge - 1989 April 25-27. Wildlife and Recreational Fisheries Branches, Ministry of Environment. July 1990. 107pp.

WR-47 Working plan — Khutzeymateen Valley grizzly bear study. A.N. Hamilton and J.A. Nagy. September 1990. 35pp. (Also printed as WHR-28).

WR-48 Khutzeymateen Valley grizzly bear study. Annual progress report - year 1 (1989/90), annual working plan - year 2 (1990/91). J.A. Nagy and A.G. MacHutchon. January 1991. 44pp. (Also printed as WHR-29).